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NEW MACHINE FOR CLEANING AND SEPARATING THE FIBERS OF LEAVES.

Two different fiber plants are known in Central America by the name *pita*. They are the wild pine apple (*Bromelia sylvestris*), also known as silk grass in Honduras, and ixtile in Mexico; and the century plant (*Agave americana*), commonly known as the American aloe.

The pineapple "pita" grows almost everywhere in tropical America, and is much used by the natives as a fiber plant. The leaves from which the fiber is obtained are from 1½ to 3 inches wide and from 5 to 8 feet long. When the plant is cultivated for fiber in Mexico the leaves are longer and the fiber exceedingly fine and strong. When the fibers are separated into their filaments by dissolving the gummy matter which binds them together a silky fiber greatly superior in strength to the best Russian flax is obtained—a fiber which is said to mix with silk better than any other.

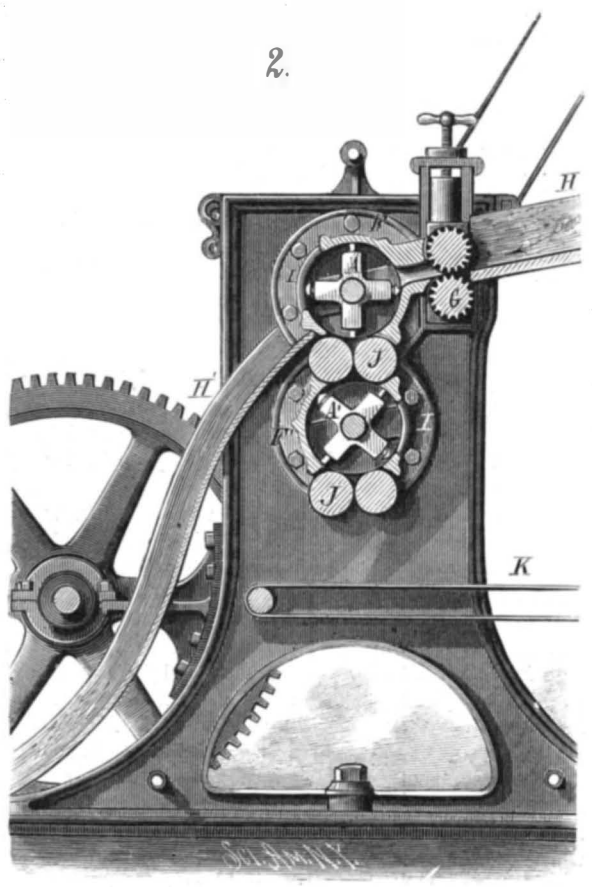
The aloe "pita" is also widely distributed throughout the tropical world, and yields a brilliant and strong fiber, though not so fine as may be obtained from the pineapple or bromelia plant. The leaves, which are from three to six feet in length, are thicker and more fleshy than those of the wild pineapple.

The plants known in Mexico by the name of Lechuguilla and Heniquen yield strong fibers which, like all other fibers of this class, are commercially valuable, providing they can be extracted from the leaves at a reasonable cost. Many attempts have been made to do this, but so far with only limited success.

We illustrate a simple and practical machine for extracting the fiber from this class of plants with great rapidity. The inventor informs us that this machine will treat twenty-eight thousand lechuguilla leaves an hour. Samples of the fiber extracted by the machine are very clean, and the fiber is long and very strong.

The larger perspective view shows the machine in active operation, and the smaller view, which is a vertical transverse section, shows the relation of the working parts.

The principal feature of this invention is the scutching cylinders, A, which is provided with yielding scutching knives or scrapers, and intermediate yielding feeding blades, which draw the leaves into the cylindrical casing surrounding the cylinder and push the refuse pulpy matter outward through



VERTICAL SECTION OF MACHINE FOR CLEANING AND SEPARATING THE FIBERS OF LEAVES.

the opening, I, at the back of the cylindrical casing, F. These scutching blades beat and scrape one side of the leaf as it is fed from the inclined feeder trough to the cylindrical casing.

The scutching cylinder revolves at the rate of about 2,000 revolutions per minute, and as the leaves are slowly fed to the machine by the fluted feeding rollers, G, they are thoroughly treated on one side by the scutching or scraping blades, which press the leaf downward between rollers, J, which carry the partly scutched leaf downward to a second scutching cylinder, A', which revolves in the opposite direction, and cleans the refuse pulpy matter from the opposite side of the leaf, and the cleaned fiber is discharged through rollers, J, to an endless apron, K, below, which moves slowly and delivers it at a distant point to be dried and baled.

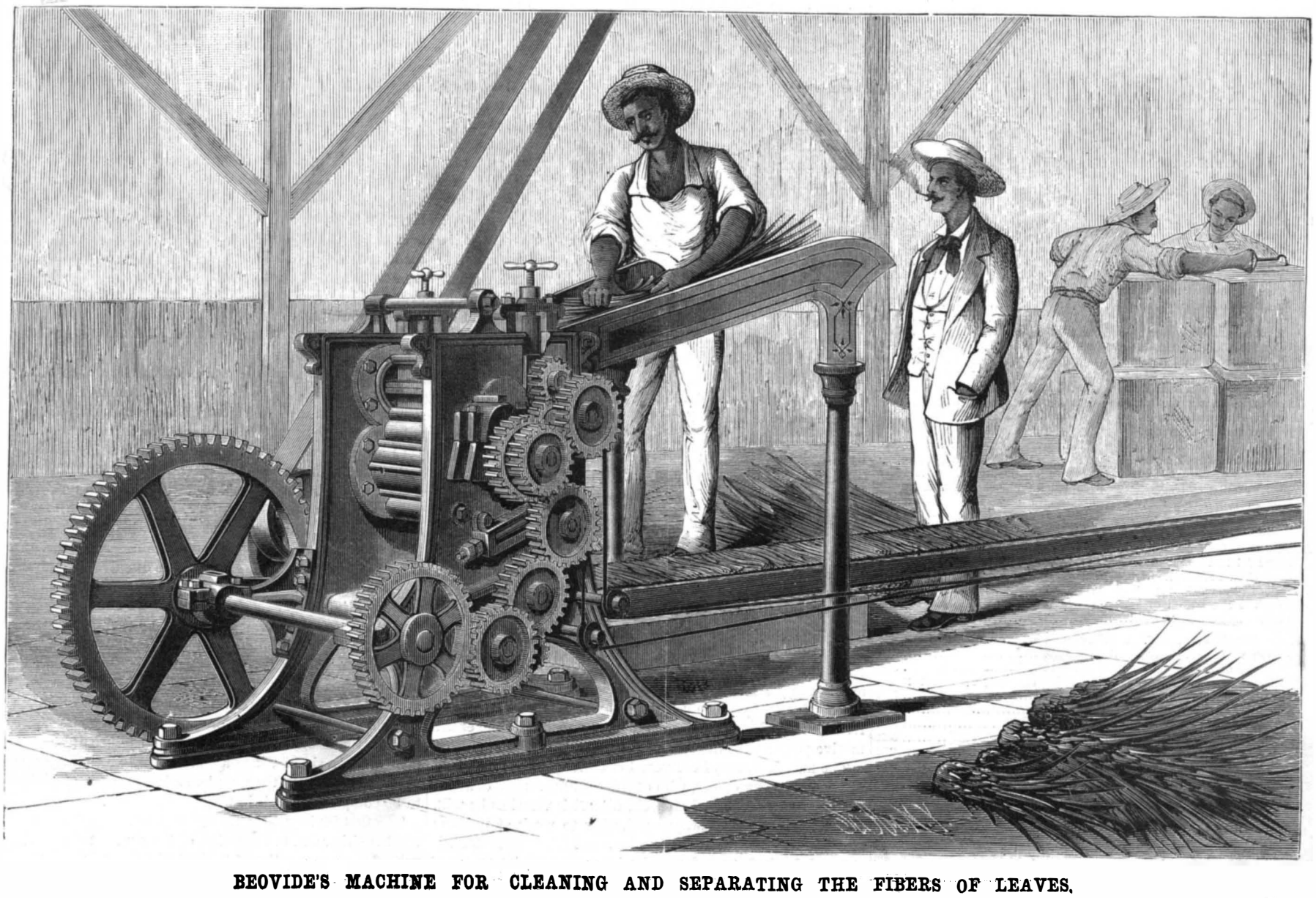
With this machine the fiber can be very rapidly and cheaply extracted from fiber-bearing plants of the character above referred to.

This machine is the invention of Mr. Eugenio Beovide, of Mineral de Catorce, Mexico, who has recently secured a patent for it in the United States.

The Faure Battery for Tramcars.

On February 22, a tramcar was run on the Leytonstone line of the North Metropolitan Tramways Company by means of the Faure accumulator and a dynamo machine connected by cog wheels and gearing to the wheels. The distance traversed was about two and a half miles. The dead weight of the car was 5¼ tons; the speed reached seven miles an hour, although the car was not of the most advantageous build for the purposes of the experiment. The experiment was successful, stopping and starting the car being effected with great promptitude. The experiment was carried out by Mr. Radcliffe Ward, engineer to the Faure Company.—*Electrician*.

GOLD TURNED INTO VAPOR.—E. W. Morley, of Hudson, Ohio, lately exhibited two slides, each of a specimen of the metallic globules said to be gold, from the roof of the Mint at Philadelphia. These were examined with a two-third objective, and Prof. Hanks stated that his examination and treatment of them with acid showed conclusively that gold would become volatilized, and no doubt pass off in the fumes from the retort.



BEOVIDE'S MACHINE FOR CLEANING AND SEPARATING THE FIBERS OF LEAVES.

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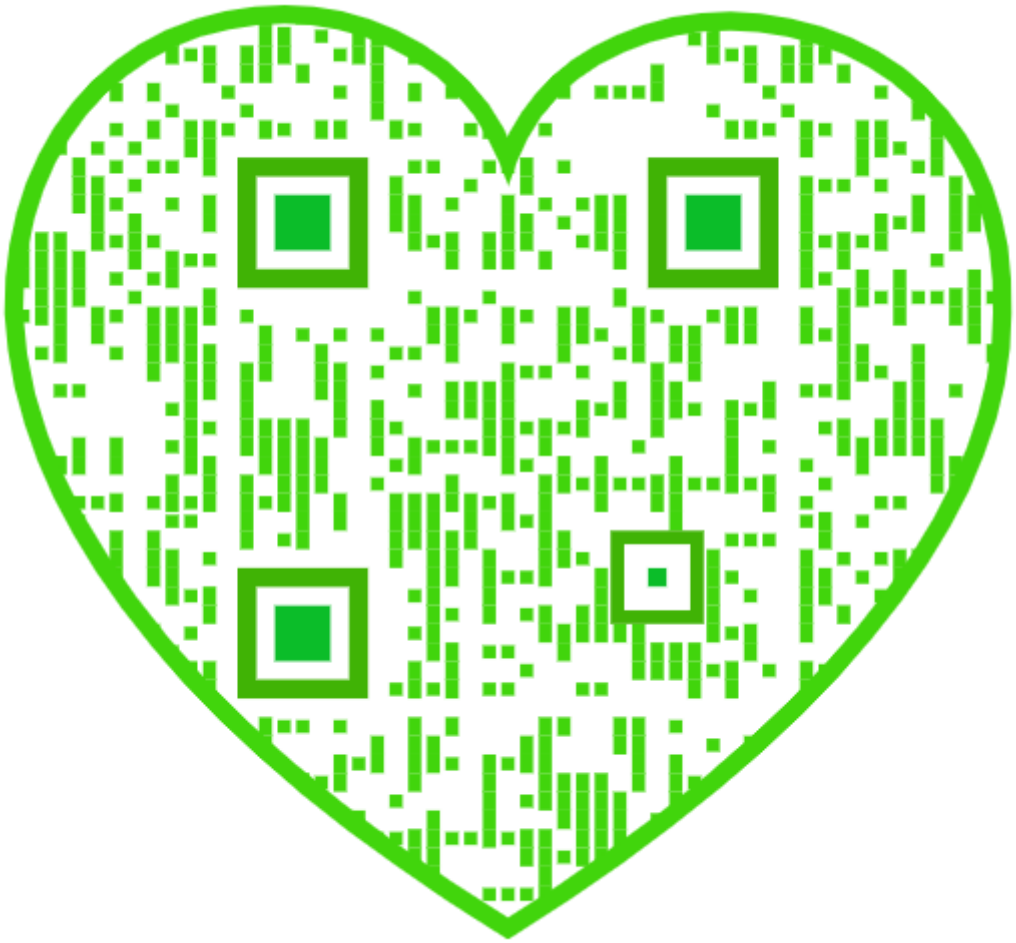

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NEW YORK, SATURDAY, APRIL 8, 1882.

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THE STEERING AND PROPELLING GEAR OF THE ALARM.

The report of the Board of United States Naval Engineers, on the Mallory steering and propelling gear as applied to the torpedo boat Alarm, develops results likely to have much influence in determining the conditions of future naval warfare.

The peculiar design and construction of the Alarm have already been described and illustrated in these columns, (SCIENTIFIC AMERICAN, March 17, 1877). The vessel, it will be remembered, is intended as a harbor and coastwise cruising torpedo boat, carrying in the bow one heavy gun and a torpedo spar of special construction. The single gun has no carriage in the ordinary meaning of the term, the vessel as a whole serving as a carriage, while the training of the gun in azimuth is effected by the steering and propelling gear, the boat moving with the gun so as to fight always "bow on."

For this purpose steering gear of great capacity and delicacy was needed, so as to hold the vessel steady while at rest, and to make her movements always prompt and thoroughly controllable, as well when backing as when progressing. The maneuvering qualities desired were first obtained by means of a horizontal feathering wheel, which failed, however, to give the requisite speed without too great a cost in power. Accordingly the propelling and steering gear invented by Colonel Wm. H. Mallory was substituted. The stern of the Alarm was ill-adapted to the use of the Mallory propeller; and such seems to have been to some extent the case also with the machinery used for driving the propeller; still in the opinion of the board of engineers the tests showed the system to be satisfactory in all respects. In their own words, "the results of the experiments show the durability, reliability, and practicability of the Mallory propelling and steering screw, and the efficiency of its application to vessels of at least the size of the Alarm, and its entire appropriateness for all the purposes to which a cruising torpedo boat carrying a heavy gun can be employed."

The Mallory system consists of an ordinary screw propeller combined with actuating mechanism for changing its axis with respect to the axis of the vessel so as to absolutely control the speed and direction of the vessel's motion, while the propelling machinery remains in permanent connection with the screw and unchanged in its movement. The shifting of the axis of the propeller is effected by a pair of auxiliary steam cylinders called steering engines, whose action is controlled by the commanding officer on deck. By means of the steering engines, the screw as a whole, together with its horizontal shaft, can be turned horizontally entirely around the axis of a vertical shaft, on which it is supported either while it is being revolved by the motive engines or when the latter are at rest. When driven by the motive engines it is a propelling screw; moved by the steering engines it is a steering screw; and it may be either or both together at will. The screw as a whole can be turned horizontally around the axis of its vertical supporting shaft with the motive engines either at rest or in motion. Neither the motive engines nor the steering engines are ever disconnected from the screw. The horizontal screw shaft does not extend into the vessel, but is supported in two pillow blocks situated in and forming part of a hollow brass vertical shaft, the lower end of which is made into a journal and held in a lignum vitæ vertical bearing secured on the upper side of the shoe at the stern of the vessel. The upper end extends into the overhanging counter of the vessel, and to it is secured a horizontal worm wheel of phosphor bronze, the lower side of which is supported by and revolves upon the face of a casting firmly bolted to the hull. A wrought iron worm is engaged in this wheel, and the horizontal shaft of the worm is rotated by the steering engines in the usual manner by means of cranks. The steering engines thus rotate the hollow vertical brass shaft and all it contains about its axis. The total weight of the apparatus, with a ten foot propelling screw, was a little over ten tons. To obviate certain difficulties developed in steering at high speeds with large powers, Colonel Mallory has invented an improved system, which employs two duplicate screws, having their axes in the same vertical and horizontal planes, but situated on opposite sides of the vertical hollow shaft and revolved in opposite directions by means of a system of beveled gear within the vessel, the power of the motive engines being applied through the gear, instead of through a crank, to the engine shaft. By this improvement the steering is done as easily when turning in one direction as when turning in the other, and with the same power when the motive engines are working at their maximum speed as when they are absolutely at rest.

In summing up the results of the trials the board mention as demonstrated several important advantages to flow from the use of the Mallory apparatus on gun boats. It enables such a vessel of small dimensions to support a gun of the largest size, and to use it with a promptness and precision of aim not otherwise attainable. The vessel can be kept bow on to an enemy when in advance, when at rest, or in retreat; and it can be maneuvered as efficiently when backing as when advancing. The turning power of the screw is unrivaled, and it may be so operated as to apply the entire motive power with the best possible leverage.

The maneuvering of the vessel is entirely in the hands of the commanding officer, who can, by the movement of a handle conveniently placed on deck, direct his vessel as he will, the motive engines always continuing to work at uniform speed in the same direction. "The vessel can thus be steered, stopped, backed, turned completely around on its center of lateral resistance, laid crosswise to its course, and maneuvered in every conceivable manner, all by the power of the motive engines." The importance of this ready and efficient handling of a vessel, especially in the case of torpedo boats, small rams, and gunboats, is beyond question.

The superior capacity of the Mallory propeller is necessarily attained by a considerable increase in complexity and cost of the propelling and steering gear, which must also be somewhat less reliable and durable than simpler mechanism; nevertheless the board are satisfied that its advantages enormously outweigh its disadvantages, certainly for the smaller naval craft. "With this system of propulsion and steering," they say, "the torpedo boat becomes a certain as well as a dreadful factor in naval warfare, and a gunboat of minimum size is able to carry the largest gun and train it in azimuth with a rapidity and accuracy not possible with any separate gun carriages," and the gun's crew may be no more than is necessary for loading and firing. For coast and harbor defense, where no large coal-carrying capacity is required, the heaviest guns may, by this system, be floated upon boats too small to be hit at long range; and when operated with the Mallory gear such boats can be handled with a celerity and precision which must make them formidable antagonists even for the heaviest ironclads.

The failure of the Alarm to make any creditable record for speed is attributed by the board to the exceedingly foul condition of her bottom, which was found to be covered with barnacles a quarter of an inch high, and overgrown in spots with sea grass four or five inches long.

VIRCHOW ON SOUPS AND BROTHS.

This distinguished German professor and politician has been accused of being the chief opponent of soup. He says that this is not true, for he had merely said that meat broths are neither nutritious nor "substantial." That if all the meat which one uses should be boiled and soup made of it the meat would become for the greater part indigestible, and the soup would not be a substitute for it. Broth, he says, is an article of luxury which only the comparatively well-to-do can afford. A family that can only just make both ends meet should learn to deny themselves this luxury, since they have a similar one in their coffee. A rich man can afford to eat soup; while the sick sometimes must have it.

Ordinary meat broth or bouillon in its pure form can only be recognized as a condiment. By the addition of eggs, flour, fat, and other things it may acquire a certain nourishing and heating value. It is, primarily, only a very dilute aqueous solution of substances that are in part of low value as heat producers, such as gelatine, and in part of the stimulating aromatic parts of the meat. Taken warm it is of nearly the same value as coffee or tea, but is inferior to wine, schnapps, or beer; it only stimulates the nerves. It has one advantage over every other condiment, namely, it contains no poisonous substance, it is incomparably milder, hence much better adapted to feeble persons, and finally it can be very conveniently combined with substances that are actually nutritious, and imparts to them an agreeable and "substantial" taste.

It must be admitted that these stimulants (soup and coffee), because they are stimulants, have more significance than mere condiments. By their stimulating power they awake the slumbering energies. So long as power is left to exert this energy these stimulants are able to vitalize these forces. Hence it produces the impression of being itself strengthening. It has not of itself this power; it can only awaken other forces already present, but cannot create them. A tired organ, a tired laborer, can find new strength in a stimulant because it arouses within him certain powers which would not otherwise have come to his aid. In this lies the secret, and at the same time the beneficial effect, of many stimulants, so that they are, of course, more than mere condiments or flavors, and become, to a certain extent, tools. Used in moderation they can do much good in this direction. But it must not be forgotten that they are not food, and that every energy brought forth by stimulants requires a double influx of substance to replace that consumed, so that it may not result in exhaustion. Condiments can never take the place of nourishing food.

A large portion of our food, it is true, acts at the same time as a condiment, and even as a stimulant. By this is not meant those natural mixtures of nutritive and stimulating substances so frequently found combined in vegetables, nor yet those artificial compounds prepared by skilled cooks, but rather food which has been eaten refreshes and strengthens a person long before the real digestion has been finished. A laborer, who is tired and hungry, has set before him a meal of meat and potatoes, and as soon as his meal is eaten he feels refreshed and ready for work again. Nevertheless it is three or four hours before the meat is dissolved and absorbed into the blood, and even if a portion of the potato starch is converted into sugar or glucose while he is chewing it, it is decidedly the smallest portion. The feeling of strength which the man is sensible of cannot possibly come from the assimilation of his food into the tissues. Its direct effect upon the surface of the organs of digestion and a very slight absorption of the material into the blood exert sufficient stimulus to overcome or relieve the weary condition. It is only on this ground that we can explain why a drink of fresh cool water, a sip of wine or beer, seems to be as invigorating as, or even more so than, a piece of roast beef, although not to be compared with it in permanent effects.

The first invigorating effects that we experience after a meal is either due to the action of the condiment or is the result of those properties of food which place them on the same

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footing with mere condiments. Afterward the true digestion takes place, the replacing of the material consumed in work, and with it the sensation of permanent strengthening.

It is this point of view which is often lost sight of by the new school of physiologists who treat of nurture and sustenance. The confusion that exists in regard to the best method of giving nourishment is a natural result of the very one-sided treatment of the whole question, from a purely chemical view, and the error is increasing rather than otherwise. Chemical investigations have a very subordinate importance in recognizing the exciting power of real food and of condiments; the physiological view must here be taken. Virchow, therefore, attempts to restore to the latter science, physiology, its old rights, and hopes to protect scientists and laity from that one-sidedness which always supplants one error by another, and which has nowhere led to more visible results than in this important and interesting domain.

The words of so careful a writer and so thorough an investigator deserve the attention of thinking men on both sides of the question.

Water from Lake George to New York City.

Surveys have been made for an aqueduct 225 miles long to bring to this city and the towns along the Hudson a supply of water from Lake George. The lake is about 34 miles long, and averages from 1⅔ to 1¾ miles in width, and has an area of about 50 square miles. By a short turn at the head of Dunham's Bay, the report says, a new outlet can be made toward the south. The lake has a little more than 3,000 square miles of watershed. It is assumed that by a short canal the surplus waters of the upper Hudson tributaries may be conducted into Lake George to re-enforce the reservoir.

It is estimated by Col. J. T. Fanning, the chief engineer of the projectors of the scheme, that a daily average of 1,500,000,000 gallons of exceptionally pure water would thus be made available for city supplies. It is proposed that the conduit shall be at the first construction an open canal, with a capacity of 500,000,000 gallons a day. At Lake George it will be 322 feet above mean tide water, at Yonkers 213 feet, and above the Harlem River 200 feet. It is anticipated that the entire canal will be covered in time, and its capacity thus increased in midsummer by the consequent reduction of evaporation, and in winter by reduction of thickness of ice. It will be paved its entire length and the smoothness of its sides improved, and thus the rapidity of flow and capacity of the canal enhanced. Short tunnels will be required in several instances along the route to reduce the length of line that would be required to pass around prominent spurs, as, for instance, at Fishkill Mountain and Anthony's Nose. Siphons will be required in several instances, and where the pressure exceeds twenty feet they will be of boiler iron in a series of 72-inch diameter riveted tubes, in number according to the required delivery of water. These tubes will be placed side by side, and the number will be increased as the demand for water increases. Stop gates, waste weirs, and waste sluices will be introduced as the topography of the line and other conditions shall make it desirable. The canal from the river to the lake will be larger in section than the conduit, so as to provide for the rapid storing of water when the flow of the river is above the average. From the terminus of the canal, near High Bridge, the water may be conveyed into New York, Brooklyn, Jersey City, and adjacent towns by iron pipes.

The approximate estimate of the cost for 210 miles of canal is $26,250,000; 7 miles of tunnel, $4,900,000; 10 miles of siphon, $10,000,000; and the Hudson dam and canal, engineering, land and water rights, and roofing and paving 10 miles of the canal, will bring the whole cost to $49,475,000. It is estimated that three years would be required for the construction of the entire works.

A Church Steeple Thermometer.

The Meteorological Society have placed one of Siemens' electrical thermometers on the summit of Boston Church, in Lincolnshire, which is 270 feet high, and situate in a flat country near the sea. Ordinary thermometers have been placed on the belfry roof, 170 feet from the ground, and also in the churchyard. The electrical thermometer is connected by wires to a galvanometer and battery at the base of the tower. The instrument is read by depressing a key, which causes the needle of the galvanometer to deflect; a pointer or vernier (moving a contact roller upon a wire in a circular groove) is then pushed to the right or to the left upon a divided scale until the needle remains stationary on the zero point, when the electrical resistance of the wire is measured upon the scale. The number indicated by the vernier is then read off, and, by referring to a table of equivalents, the actual temperature in degrees of Fahrenheit is readily ascertained. Simultaneous readings of the electrical thermometer at the summit of the tower and of the dry bulb thermometer in the churchyard will be made frequently during the day by the verger of the church. The society hope by this means to throw light on such questions as the vertical decrement of temperature, the rate of ascension of vapor, etc.

The Six Companies.

Kwong-Ki-Chin, late a member of the Chinese Education Commission in the United States, says that the object of the Six Companies (of whom so much is heard in connection with Chinese immigration) is not mercantile but protective. The word "association" would better characterize them. They are not stock companies organized for trade or profit, but associations, rather, for the sake of looking after the interests of Chinese who are away from home, such as adjusting differences and deciding questions and claims one with another and securing justice between parties without going to law if possible. They are not peculiar to America, but are established wherever Chinese emigrate or settle, as in Australia, Singapore, French colonies in Cochin China, etc Three of the Six Companies, so called, belong to three different districts in China; two of the other three represent together several districts, and the last, or sixth, represents all China. Cases of injustice or difficulty of any kind which occur will, on complaint to the company, be investigated and assistance rendered. Each company has two presidents, one of whom must be a good Chinese scholar, and the other must understand English well. They are chosen by the merchants of the company, and hold office for a period of three years. These, with necessary clerks and servants, comprise all the officers of the company. The committees of the company are merchants. They, in conjunction with the presidents, act in cases requiring interference of the company. The expenses of the company are met by the payment of $10 or $15 by each merchant or laborer on his way to China; so it is not a cooly importing company at all, but a mutual benefit association.

Malarial Germs.

M. A. Laveran has found, in the blood of patients suffering from malarial poisoning, parasitic organisms, very definite in form and most remarkable in character; motionless, cylindrical curved bodies, transparent and of delicate outlines, curved at the extremities; transparent spherical forms provided with fine filaments in rapid movement, which he believes to be animalcules; and spherical or irregular bodies, which appeared to be the "cadaveric" stage of these, all marked with pigment granules. He has also detected peculiar conditions in the blood itself. During the year that has passed since he first discovered these elements, M. Laveran has examined the blood in 192 patients affected with various symptoms of malarial disease, and has found the organisms in 180 of them, and he has convinced himself by numerous and repeated observations that they are not found in the blood of persons suffering from diseases that are not of malarial origin. In general, the parasitic bodies were found in the blood only at certain times, a little before and at the moment of the accession of the fever; and they rapidly disappeared under the influence of a quinine treatment. The addition of a minute quantity of a dilute solution of sulphate of quinine to a drop of blood sufficed to destroy the organisms. M. Laveran believes that the absence of the organisms in most of the cases (only 12 in the whole 192) in which he failed to find them was due to the patients having undergone a course of treatment with quinine.

Burnishing.

By burnishing the roughness of an object is flattened down until the surface is smooth and polished like a looking glass. Burnishing is an important operation for electro-deposits, which consists of a multitude of small crystals, with intervals between them, and with facets reflecting the light in every direction The deposited metal is hardened, and forced into the pores of the underlying metal, and the durability is thus increased to such an extent that, with the same amount of silver, a burnished article will last twice as long as one which has not been so treated. The instruments employed for burnishing are made of different materials, and must be of great hardness and a perfect polish. Such are hardened cast steel, agate, flint, and blood stone. For metallic electro-deposits steel and blood stones are especially employed. There are several qualities of blood-stone; its grain should be close, hard, and without seams or veins; it should leave no white lines on the burnished parts, nor take off any metal, and its color should be of an intense black red. The steel must be fine and close grained, and perfectly polished. Should the polish of any burnishing tool alter by use, it is restored by friction upon a skin or leather attached to a wooden block, which is fixed to the bench. The leather is covered with polishing rouge in impalpable powder, or, preferably, with pure alumina, obtained by calcining ammonia alum in a forge fire. Venetian tripoli, rottenstone, tin putty, emery, or many other hard substances finely powdered may be employed. The burnishing tools are of various shapes, such as a lance, a tooth, a knife, a half sphere, or a dog's tongue, and a considerable stock is necessary. The burnishing is divided into two distinct operations. The first consists in roughing, and the second is finishing. The tools for the first have a sharp edge, while for the second operation they have a rounded surface. The tools for the hand or the lathe are fixed by copper ferrules into short round wooden handles, so that the hand is not influenced by their weight. The tools for the arm or vise are fastened to wooden handles sufficiently long to rest their slender part upon the arm or shoulder. The stouter lower portion is grasped by the hand. The burnishing tools and the objects must be frequently wetted by certain solutions, some of which facilitate the sliding of the instrument, or with others which have a chemical action upon the shade of the burnished articles. Of the first are pure water, solutions of soap, decoctions of linseed, and infusions of the roots of marsh mallow or licorice. The second includes wine-lees, cream of tartar, vinegar, alum in water. When burnishing gold applied upon electro deposits of copper, as is gilding with a dead luster by that method, use pure water, for fear of producing a disagreeable red shade. A solution of green soap is sometimes preferred by operators, although when old, it imparts an unpleasant tinge, owing to the sulphides of the liquor When the burnishing is completed, the surface is wiped longitudinally with a soft and old calico rag. The polish obtained by burnishing is called black when it reflects the rays like a mirror; and should the presence of mercury or a bad deposit prevent the tool from producing a bright surface, the object is said to be greasy. Articles which have been previously polished, and which generally receive a very trifling deposit, are not burnished, but rubbed with chamois leather and the best polishing rouge. Too thick or too rapid electro deposits cannot be burnished, but must be polished by rubbing with a leather and a mixture of oil and powdered pumice stone, tripoli, or tin putty. Coarse powders are used at the beginning, and impalpable ones at the end of the operation. Polished silver deposits are more agreeable to the eye than burnished ones, but the hardening of the latter renders them more durable.

A Three-Story Nest.

To the Editor of the Scientific American:

Since my article upon the summer yellowbird and its two-story nest appeared in the SCIENTIFIC AMERICAN of March 18, I received Part IV of "Bright Feathers," in which Mr. Rathburn describes and illustrates a three-story nest that was found upon a honeysuckle. I mentioned the fact of three-story nests being sometimes found, but this one described by Rathburn is an interesting specimen, from the fact that the second compartment is said to have contained one cow blackbird's egg and one of the legitimate eggs of the D. æstiva. According to Baird Mr. Nuttal says that "where the parasitic egg is laid after her own, the summer yellowbird acts faithfully the part of foster parent." But from the specimen described by Mr. Rathburn we must be led to believe with Mr. Baird that the yellowbird will not act the part of foster parent, and rather than do so will sacrifice her own eggs with those of the obnoxious cow blackbird.

Yours truly, DANIEL C. BEARD.

New York, March 28, 1882.

Remarkable Brain Wound.

Coroner Merkle was called, March 29, to the Eye and Ear Infirmary, at Second avenue and Thirteenth street, to hold an inquest in the case of Lewis E. Avery, aged 18, a resident of Gilman's Depot, Sullivan County, N. Y., who died at the infirmary from the effects of an accident which occurred on September 18, 1881. While out shooting near Forrestburg, Sullivan County, the breech of his fowling piece blew off, and the breech pin entered the head through the orbital plate of the skull over the right eye and embedded itself in the anterior lobe of the right hemisphere of the brain. Dr. M. J. B. Messemer, Deputy Coroner, made an autopsy, and found the breech pin—a piece of iron 1⅜ of an inch in length and half an inch in thickness—embedded in the anterior lobe of the right hemisphere of the brain. Death resulted from exhaustion due to the injury of the brain. The case is a peculiar one from a surgical point of view, owing to the long time the patient lived with the breech pin embedded in his brain.

This case was noticed in this paper a few weeks ago. The patient appeared to recover from the wound in about a month after the accident; but his eyes began to trouble him last January, and he came for treatment to the infirmary in this city, where he died.

Metallic Designs on Glass Obtained by the Aid of Photography.

An ingenious method of obtaining mirror-like designs on glass has been devised by Leclerc. The glass, having been silvered by the chemical process, is coated with a thin and uniform layer of sensitive bitumen, and this is exposed under a transparency, the next step being to wash away the unaltered bitumen with oil of turpentine, so as to leave the bituminous design on the silvered glass. The application of moderately strong nitric acid removes the silver, excepting where it has been protected by the bitumen, so that the metallic design shows like a mirror from the reverse side of the glass. The plate may be backed by paint or any other suitable material.

Water Works for Havana, Cuba.

The same firm in this city which furnished the city of Havana with gas works last year, have contracted to construct works for supplying that city with water. One of the contractors states that the system will resemble that of New York city. The water will be brought from mountain springs, about six miles from Havana, to a central reservoir, from which it will be distributed over the city. The pumping engines and machinery will be supplied from this city, and the work will be done by a corps of American engineers.

The Fastest Ocean Trip.

The steamship Alaska, of the Guion Line, now stands at the head of the list of fast ocean vessels. The recent trip across the Atlantic was accomplished in 7 days 6 hours and 43 minutes actual time. She sailed from this port on March 21 and passed Fastnet at 5:20 P.M. on the 28th. The fastest voyage which had been made previous to this was by the famous Arizona, also of the Guion Line, which crossed the Atlantic in 7 days 7 hours and 48 minutes. The weather is not reported to have been unusually fine.

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MECHANICAL INVENTIONS.

Mr. Thomas Long, of Boston, Mass., has patented an improved centrifugal drying machine, which can be charged and discharged without stopping the machine. The invention consists in a conical perforated hood attached to a studded receiving plate contained in the upper part of the hood and attached to the top of the shaft of the machine, which receiving plate throws the sugar or other material down upon the annular bottom of the hood, which bottom is attached to arms fastened to a sleeve surrounding the shaft and resting on the shoulders of a number of springs attached to the lower thicker part of the shaft, accordingly as the bottom of the hood is to be in a raised or lowered position. When this bottom is to be lowered the above-mentioned springs are pressed outward by means of a sleeve with a lower beveled edge and mounted in a fork of a pivoted lever.

An improved indicator for scales has been patented by Mr. Valentine M. Fulcher, of Hughes Springs, Texas. This improvement dispenses with the slides and provides for automatic indication of weight. This invention consists in a weighted rocker and indicating arm combined with a scale beam, by which it is operated.

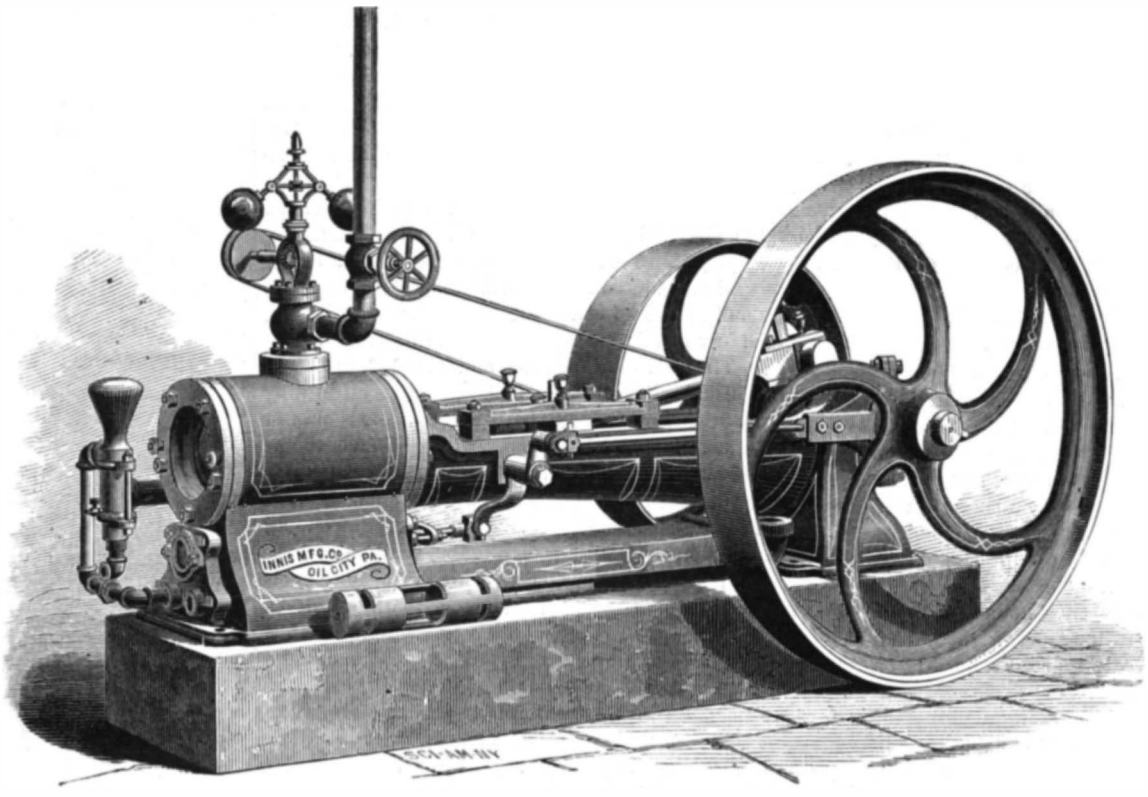
Mr. Robert J. Mitchell, of Girard, Ill., has patented an improvement in thill couplings. It consists in a packing strip of leather and an angular concaved block made of compressible material. The leather strip is pressed upon the thill iron by the concaved block.

IMPROVED STEAM ENGINE.

The Innis Manufacturing Company, of Oil City, Pa., has, for several years, been making a specialty of building a 9 x 12 engine for oil well drilling, the design of which is represented in the accompanying engraving. This engine is fully secured by patents, and is made only by this company, who now have about 1,500 in use in the oil region. These engines having given such universal satisfaction, the Innis Manufacturing Company have determined to introduce them for other uses. The demand in the oil regions for this particular size has been such as to enable this concern to arrange tools to build them on the duplicate plan, using templates and gauges for all the parts, thereby reducing the cost, while unnecessary finish is dispensed with to meet the wants of a cheap steam power. All of the working parts are strictly first class. The cylinder, valve bore or chamber, exhaust chamber (which also acts as a portion of the heater), and the supports or leg of the cylinder, are all cast in one piece, to which the bed is firmly bolted. The valve, which is of the piston kind, is placed directly below the cylinder, and the exhaust chamber directly below that. By this arrangement the cylinder readily frees itself of condensed water, as the ports are open from the bottom of the cylinder downward to the heater when exhausting. There is a steam passage around the outside of the cylinder and under the jacket that conducts the steam into the central port of the valve, from which it passes up into the cylinder from the ports near the end alternately as the valve travels back and forth, and exhausts down past the end into the exhaust chamber or heater.

The valve (which is seen lying on the engine block) is claimed by the inventor to be a great improvement over the ordinary piston valve. It really acts as its own steam chest, being always full of steam up to as nearly boiler pressure as practical. It is a long hollow shell, very thin and light, having a large amount of bearing surface in proportion to its weight, and consequently subject to but very slight wear. We are informed that one in the manufacturer's shop, after five years' constant use, appears as good as new. It being a balanced valve, the wear of the eccentric and all the valve gear is very slight. The bed is of a very rigid form, being trough-shape, the top edge of which forms the lower slide for the crosshead, and is on a line of the center of the cylinder and main shaft, and takes the strain in a direct line of the power applied. The pump is worked in the usual way from the crosshead. The heater is composed of four one-inch pipes, the entire length of cylinder and bed, and delivers the water to the boiler very hot. Pump and heater are dispensed with when not required. All parts are easily accessible.

This engine is very strong and rigid, and is at the same time inexpensively constructed. Further particulars may be obtained by addressing the manufacturers as above.



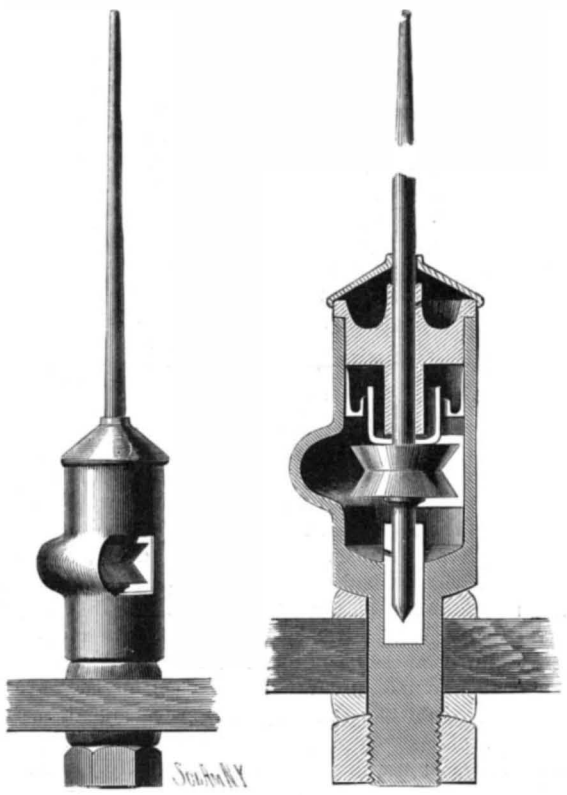
INNIS' STEAM ENGINE.

NEW DANISH POLAR EXPEDITION.—The Danish Chamber voted, March 17, an appropriation to help pay the expenses of an Arctic expedition, which is to start from Copenhagen in July next.

IMPROVED SPINDLE.

The engraving shows, in elevation and in section, an improved device for supporting and lubricating the spindles of ring spinning frames, lately patented by Mr. Walter I. Tinkham, of Taunton, Mass.

The step supporter is provided with a screw shank having a nut for clamping it to the spindle frame. A tubular standard extends upward from the step support, and has fitted in its upper end the bolster in which the spindle runs. The tubular standard is larger in internal diameter than the wheel, and has two openings for the driving beam.



TINKHAM'S IMPROVED SPINDLE.

In the top of the bolster there is an annular oil receiving trough communicating by a small hole with the bearing of the spindle. The bolster has a cap, which confines the oil and excludes dust from the annular oil trough and from the bearing of the spindle.

Concentric with the spindle, and just above the wheel, there is an oil intercepting cup, which revolves with the spindle. This cup is encircled by another cup arranged in the tubular standard, and having discharge openings, which deliver the oil to the inner surface of the tubular standard, down which it flows to lubricate the spindle and step.

The oil cup of the bolster being supplied with oil, the bearing surfaces of the bolster and the part of the spindle within it will be lubricated. The oil escaping and flowing from the bolster down the spindle will be caught by the intercepting cup, which, revolving with the spindle, will by centrifugal force cause the oil to rise and flow out of it and into the surrounding stationary cup or receiver, and through the holes in the bottom of which the oil will be discharged against the inner surface of the bore of the standard, or so as to drop down to the bottom of the bore without falling upon the whirl or the driving band. From the bottom of the bore the oil will flow into the step and lubricate it and the spindle foot, the step being perforated so as to allow the oil to pass freely into it.

Novel Barometers.

In the January number of the *Archives des Sciences* Professors Dufour and Amstein describe a simple registering barometer now in use in the Meteorological Observatory of Lausanne. It depends on displacement of the center of gravity of a glass tube containing mercury. The form of the tube may be described as that of an L leading down to a U by a vertical portion. The lower end is open. The tube swings in the plane of its angles on a horizontal axis placed above the center of gravity; with increased barometric pressure it inclines to the right, with decreased pressure to the left; and these movements are recorded by means of a style attached to the U part and applied to a moving strip of paper. By a simple contrivance the pendulum of a clock is made to impart a slight shock every second swing to the tube, so as to destroy any adherence of mercury. The instrument is easily made and proves very sensitive and trustworthy.

A description of a barometer for distant points of great altitudes which could be read by means of the electric current was given at a late meeting of the Royal Scottish Society of Arts. The electric barometer consists of twenty-five tubes placed side by side on a board or round a pillar. Into each of the upper ends is fused a fine platinum wire, dipping down by tenths of an inch, so as to get a range of twenty-five tenths, or two and a half inches, with the whole instrument. A wire is taken from each of the twenty-five wires, carefully insulated from each other, together with a return wire from the cistern ends. In all twenty six wires are made into a cable and continued to any convenient place for the observer. In the observing apartment the wires are separated and attached to a dial, which is connected with an electric bell and battery. If the barometer were placed on a hill and a cable taken therefrom to the observer, the height of the mercury would be ascertained by finding the shortest wire, when in circuit, which would ring the bell. To arguments which might be urged that readings of tenths were not fine enough, it might be said that such readings were better than no observations at all.

How to Increase the Light of Gas Flames.

Mr. W. Lascelles Scott lately stated that he had arranged an ordinary fish-tail burner at an angle of from 60° to 45°, and allowed finely divided alkaline earths to percolate through the flame; and he found that without any increased consumption of gas, a fairly marked increase of light resulted. The mean results of several experiments were as follows: With a normal flame of 16·71 candles, the addition of pure lime gave 17·95, of magnesia 17·13, and, curiously enough, of an intimate mixture of lime and magnesia, a larger increase than either separately, namely, 18·23. The same mixture, with the addition of ten per cent of another earth, gave 18·34. With a specially constructed Argand burner, the flame being conical, the light was raised from 62·4 candles, burning gas alone, to 67·3 with the addition of lime only, and with lime and magnesia to 68·5.

Daniel Drawbaugh's Telephones.

The People's Telephone Company has obtained the testimony of about one hundred and thirty witnesses at Harrisburg, Pa., to show that Daniel Drawbaugh, who resides in the adjoining county of Cumberland, invented the first magneto-telephone, and its side of the great case will soon close in this city with the examination of an expert electrician who has tested all of Drawbaugh's inventions. The testimony given thus far goes to show that Drawbaugh invented at least half a dozen speaking telephones before Bell conceived the idea that sound could be transmitted by electricity. Drawbaugh, according to this testimony, began thinking about sound transmission in 1861, and in 1867 invented a machine which carried sound by means of a voltaic battery. In 1871 he made a magneto-electrical instrument which transmitted speech, and which is said to embody all the principles of the Bell telephone of to-day. In 1874 and 1875, it is claimed, he made marked improvements on this invention before Bell had any thought of telephonic communication. Since the Bell telephone went into operation Drawbaugh has invented a machine which he claims, according to tests made, will carry speech at least one thousand miles, and will not be affected by atmospheric influences. This same instrument, he thinks, can be made to transmit sound an indefinite distance. The American Bell Telephone Company, which is resisting the claims of the People's Company will begin taking testimony in a few weeks. In New York, next summer, it will be decided whether Bell or Drawbaugh invented the first magneto telephone.—*Operator.*

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The Composition of Glass.

Glass is a salt, every salt being the result of a combination of an acid with an alkaline base—that is, an alkali or alkaloid of organic nature. In the case of glass the acid is silica or silicic acid, and the base a mixture of an alkaline with an earthy base, such as lime, or with the oxide of one of the heavy metals, such as lead. Silica exists in nature in such minerals as flint, agate, rock crystal, or quartz. Its character as an acid was first clearly established by Berzelius. This does not appear until it is at a red heat, when it acts very powerfully, and, expelling other acids, combines with bases to form solid compounds or salts called silicates. Glass may be made by substituting boracic acid for silica. It is remarkable that while the silicates formed by nature crystallize, those made by art do not. Potash and soda are the most important ingredients, next to silica itself, in glass. They act as a flux, rendering the glass easy to melt. Lead renders glass brilliant, clear, and fusible, but in excess softens it. Lime increases the density, hardness, and luster of glass. Carbon in the form of charcoal aids the fusion. Glauber's salt with lime is sometimes used instead of soda, and muriate of soda, or common salt, is extensively used as a flux for coarse ware. A small admixture of the black oxide of manganese is essential in making flint glass, its property being to clear and purify the mass from the discoloration caused by particles of carbon and iron. For this reason it is called the "glassmaker's soap," as it appears to wash away all impurities. In excess, manganese causes reddish color. This may be removed by agitating the glass. Coarse green glass is, however, made white by an excess of manganese. The purple-pink windows sometimes seen in dwelling houses are made so with manganese. As a general principle, the glass is less fusible and offers greater resistance to the action of water and acids the larger its proportion of silica and alumina, while the contrary results from an excess of potash, soda, baryta, lime, magnesia, or oxide of lead. Luster and the refractive power of glass are produced in the highest degree by lead glass, next by baryta, next by potash, and least by soda glass.

A very important invention was made by M. De la Bastie, which has been fully tested and verified by scientific men in London and New York. It consists of plunging hot glass, manufactured in any form, into hot oil, or a heated oleaginous compound. When cool it becomes almost as tough as metal, so that a cup or mirror made of it may be thrown violently many feet or dropped on a stone floor without receiving any injury. When very violently broken it separates into granulated fragments, without sharp edges, so that the danger of being cut by it is much diminished. The process does not affect the transparency or beauty of the glass in any way.

The base of all glass is sand, and the quality of this is of great importance. Formerly calcined and powdered flints were used, but now sand procured from mines in various places is used. To fit it for use it is dried or burned, sifted, and washed. Much fine sand is taken from New Jersey to France.

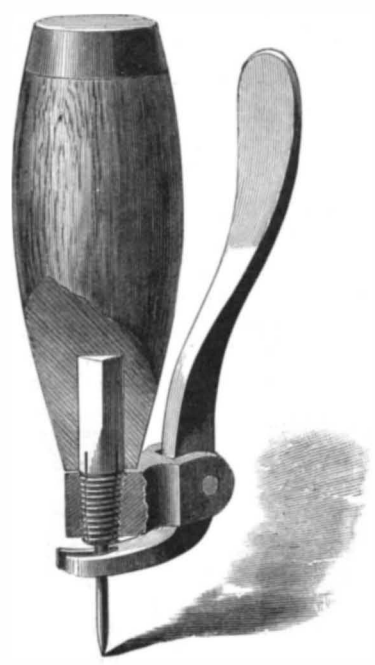
In preparing the frit, saltpeter, binoxide of manganese, and arsenic are sometimes used to purify the melted metal. Red lead (minium, Pb_3O_4) has the same effect in the compound glasses, which renders it superior to litharge. Lime, soda, and potash are used in all their forms. Coal, wood, or peat is the common fuel, great care being taken to exclude the smoke or carbonaceous deposits, and to use only the best qualities. In some furnaces powdered resin is employed to great advantage.

In the manufacture of French window glass a mixture is used of 100 parts quartz sand with from 30 to 40 parts of dry carbonate of sodium (or as much sulphate with charcoal, and 30 to 40 parts of chalk. German window glass consists of a double silicate of chalk and potassa: 100 parts of quartz sand, 50 parts of pearl-ash, from 25 to 30 parts of chalk, and 2 parts of niter. In many mixtures common salt is an ingredient. According to A. F. Gehlen it is prepared with 100 parts quartz sand, 50 parts of dry Glauber's salt, 17·5 to 20 parts of lime, and 4 parts of charcoal. Peligot's formula is: Silica, 69·06; lime, 13·04; soda, 15·2; alumina, 1·18. An analysis of ancient window glass from Pompeii gave: Silica, 69·43; lime, 7·24; soda, 17·31; alumina, 3·55; oxide of iron, 1·15; oxide of manganese, 0·39, with traces of copper. No fixed proportion of materials can, however, be agreed upon, and the manufacturer has to determine the amount of real alkali in every fresh supply of ash.

The manufacture of window glass, though conducted here for more that seventy years, was for many years conducted under difficulties from the alleged superiority of the English crown glass. After a time such improvements in the manufacture of cylinder or sheet glass were made in England that it was regarded as equal in quality and brilliancy to the crown glass, and could of course be made of larger sizes; but the Pittsburg manufacturers have far surpassed in size and in uniform thickness the English. The largest size of sheet glass ordinarily made in England is 50x30, or possibly 35 inches. At Pittsburg sheets 70x40 inches, and of uniform thickness of seven to the inch, are not uncommon. These are the "double strength," and are very remarkable for their uniformity. In the dexterous handling of these immense cylinders, and so managing them as to make them of uniform thickness and freedom from blemishes (a very difficult matter), the American manufacturers have been remarkably successful. They are also free from the liability to rust or devitrification, caused by the excess of alkali in the glass, which has been so serious an objection to much of the German and some of the English window glass.—*Glassware Reporter.*

NEW PEGGING AWL

No one having seen a shoemaker tugging to remove his awl from his work will fail to see the utility of the invention shown in the engraving. It is a simple and effective device for withdrawing the pegging awl from the shoe sole after it has been driven in to make a hole for the peg, and it also serves the purpose of a wrench for securing and releasing the awl. The sleeve which usually screws on the awl-holding chuck is provided with an arm to which is pivoted a right-angled lever, the longer arm of which extends upward along the side of the awl handle, while the shorter arm is forked



LOGAN'S PEGGING AWL.

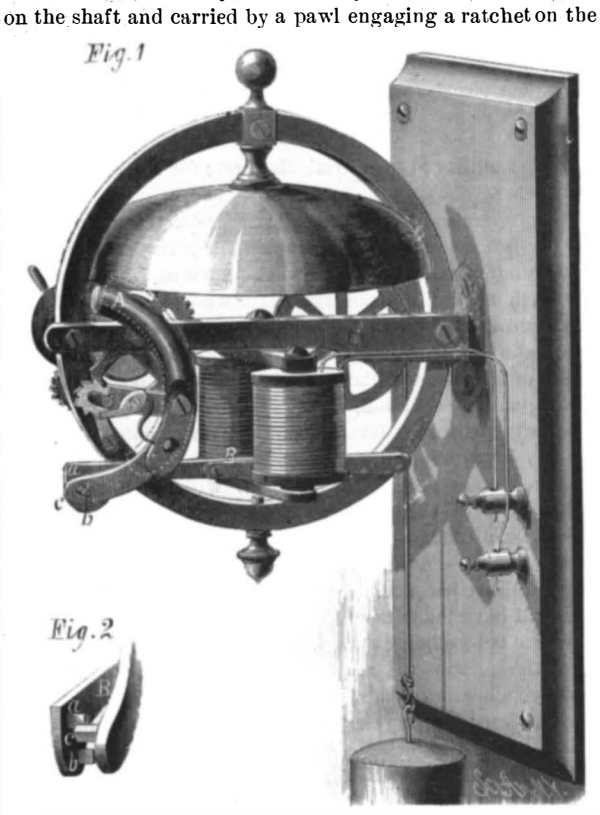
and extended beyond the awl. After driving in the awl, pressure on the longer arm of the lever by the hand grasping the handle forces the shorter arm of the lever against the work and withdraws the awl with very little exertion.

This invention was lately patented by Mr. Thomas H. Logan, of Lowell, Msss

NOVEL STRIKING MECHANISM FOR ELECTRIC BELLS.

The device shown in the engraving provides for a long stroke of the bell hammer, with the movement of the hammer always in one direction. The hammer is made in the form of a segment of a ring, and is carried by a shaft driven by a weight or spring. The hammer is released and stopped by an escapement controlled by an electro-magnet.

The hammer, A, is pivoted loosely to a curved arm placed on the shaft and carried by a pawl engaging a ratchet on the



BOWERS' STRIKING MECHANISM FOR ELECTRIC BELLS.

shaft. The outer end of the hammer is free to swing in and out through a limited distance, but is held normally at the inner limit of its movement by a spring which also holds the pawl into engagement with the ratchet.

On the end of the curved arm there is an escapement pin, *c* (see Fig. 2), and on the armature lever, B, are two lugs, *a b*, placed one for contact with the end of pin, *c*, when the armature is down, and the other for contact with it when the armature is raised in contact with the magnet. The contact of the lugs, *a b*, by pin, *c*, arrests the hammer and prevents its being revolved by the weight.

The curved hammer is below the edge of the bell, at one side, in such position that the hammer strikes at about the end of its upward movement. As the shaft carries the hammer the centrifugal force acting on the long arm overcomes the resistance of the spring acting against the short arm, and throws the end of long arm outward, so as to come in contact with the bell; this checks it and allows the spring on short arm to force the end of long arm inward, when it passes the bell and moves on until arrested by the pin, *c*, and lug, *a*. When the armature is raised by closure of the magnet circuit the lug, *a*, is raised above pin, *c*, and the lower lug, *b*, brought behind the pin. When the armature is released by breaking the circuit the lug, *b*, is carried down, and the pin, *c*, being released, the hammer revolves, and the blow is struck at completion of the revolution.

This invention was recently patented by Mr. George E. Bowers, of Fitchburg, Mass.

Proposed Telegraph Stations in the Ocean.

A Frenchman, M. Menuisier, has just proffered a novel and bold plan for enabling vessels crossing the Atlantic to communicate with the mainland. Lay, he says, a telegraph cable between Saint Nazaire, Bordeaux, and New York, with branch in mid ocean to Panama. Every sixty leagues, the average daily distance covered by a ship, connect to the principal cable a vertical cable ending in a buoy at the surface. To the right and left of the principal cable lay two branch cables, ten to twenty leagues each, ending in a vertical cable with buoys. These branches would form two crosses with the main cable. The chances of ships sighting buoys would thus be frequent. Each buoy has a number, and its position in mid-ocean is known from special tables. When a ship passing near a buoy wishes to telegraph it connects its apparatus wire, one with the wire of the buoy, the other with the buoy itself, which serves as an earthwire. Thus the ship might communicate with a central post which should be established on an island or rock, or a ship moored according to M. Menuisier's system. A vessel in distress near one buoy might, through the central station, get help from a ship passing near the next buoy. The difficult matter would be the buoy. How would it resist storms that have broken cables? M. Menuisier has not yet described it in detail, but says it is pronounced quite successful by competent navigators. It is luminous by night, sonorous in fog, and easily accessible in any weather.

American Manufactures in Australia.

While the United States, by means of exorbitant duties, preclude our manufacturers from competing on a fair footing with American-made goods in the States, our cousins are not slow in pushing their goods wherever there is an opening. The following articles are imported into New South Wales from America by a Sydney firm:

Axes, squaring axes, hunters' hatchets, lath and shingling hatchets, mattocks, picks, shovels and spades, sugar cane knives, Boynton's saws, Disston's saws, trowels, wrenches, scythes, hay rakes, hay forks, scythe, ax, pick, hoe, hammer, spade and shovel, and broom handles, digging forks, millet brooms, cattle bells, turpentine, resin, wood-working machinery, angle boring machines, iron planes, American tacks, tinned and blued; Hungarian nails, finishing nails, bolts and nuts for carriage work, spirit levels, mouse traps, clothes wringers, gate latches and hinges, sewing machines, kerosene lamps, Fairbanks' scales, grindstone fixings, tinsmiths' tools and machines, novelty braces, oil stones, farriers' hammers and adz-eye hammers, clothes pegs, clocks, plated goods, carriage woodwork and ironwork; leather, japanned and enameled; enameled duck and drill; locks, drawback, rim, mortise and pad; lock furniture, lift and force pumps, lanterns, hat and coat hooks, tinned wirework, lemon squeezers, egg whisks, axle grease, buggy axles, firmer chisels, miter boxes, rolling pins, wood and glass, glass reflectors, sash fasteners, shelf brackets, bronzed barrel bolts, sash lifts, draw pulls, carpenters' mallets, door springs, pruning shears, carriage jacks, metallic hair and horse brushes.

Our informant adds that the above list might be greatly extended. The cause of this profitable import business carried on by the Americans with our Australian colonies is not far to seek. They generally excel our manufacturers of such articles by giving them a finish and adaptability to local requirements which we have yet to learn. It is not the first time that this has been pointed out.—*Iron.*

SOME little time ago Miss Frances Power Cobbe, who has so identified herself with the cause of anti-vivisection, called on a distinguished man of science in London to endeavor by persuasive speech and viva voce argument to gain him over to her cause. Three points were observable in Miss Cobbe's outward presentment, namely, she had an ostrich feather in her bonnet, a bird of paradise on or near her muff, and she carried an ivory handled umbrella. Consequently the distinguished man of science replied as follows: "Madam, charity begins at home. When you have given up wearing ostrich feathers, which are plucked from the living bird, causing the most exquisite pain; and birds of paradise, which, in order to enhance their beauty and luster, are skinned alive; when you have abjured the use of ivory, because you know that the tusks are cut out of the dying elephant's jaw—then, and then only, come and upbraid me with the cruelty of my operations. The difference between us is, madam, that I inflict pain in the pursuit of knowledge and for the ultimate benefit of my fellow creatures; you cause cruelty to be inflicted merely for your personal adornment."

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JUPITER.

No planet of the system affords a more satisfactory study for the telescopic observer than the one that wins, for his giant size and beautiful appearance, the name of the Prince of Planets. The interest has been greatly increased during the last four years by marvelous changes that are taking place on his surface, all bearing testimony to the tremendous commotion that agitates his chaotic mass.

The most noteworthy markings on his disk at the present time may be classed in three divisions: the great red spot below his south equatorial belt, the rose-colored northern belt, and the luminous white spot near his equator. A great many astronomers have made careful notes of these markings, but those of Mr. Denning, of the Dun Echt Observatory, Bristol, England, commend themselves to special notice.

The red spot is the most familiarly known of the markings. It first appeared in the summer of 1878, nearly four years ago, and has continued ever since with scarcely perceptible change of form or color, though there is now a slackening in its motion which may be the precursor of dissolution. It is situated south of the south equatorial belt, and is parallel to it. Its dimensions are variously estimated at from twenty-two to twenty-nine thousand miles in breadth, and from seven to nine thousand miles in width. It is at least one-fourth of the diameter of Jupiter. Our globe could be rolled over the spot, and probably leave many thousand miles of space for the commencement of a second revolution. Its form is elliptical, the ends tapering to a point. At a view we had of it not long since, when passing off the disk, it resembled in form a huge cigar. The color is a lovely rose tint, in charming contrast with the soft, golden hue of the body of the planet. It has been a beautiful object for observation during the winter, even a two-inch telescope bringing it into view.

Many conjectures have been made as to its origin, which thus far rank simply as theories. Some observers consider it a rift in Jupiter's cloud-atmosphere; some think it reveals the red-hot planet beneath the clouds; and some perceive in the strange aspect the upheaval of a continent. The spot has been so long visible, and retained so unusual a condition of permanence, that careful computations of the time of its revolution have been made in the hope of determining the exact time of the planet's axial rotation. Four prominent astronomers reached a result within a second of the mean of their observations. The average was 9h. 55m. 34·5s.

The second study on the Jovian disk is the rosy belt in the northern hemisphere. Observers have actually seen the formation of this belt through the whole process. During the three closing months of 1880 there was an outbreak, and an outspread of a series of dusky spots, which were finally dispersed around the planet, and took the form of the rosy northern belt which still retains its permanence. The probability is that belt and spot are both the result of commotion in the cloud-atmosphere, which is supposed to surround the nucleus of the planet to the depth of many thousand miles.

The third and latest topic of interest on the face of our gigantic brother planet is the appearance of a number of bright spots or patches of light between the broad bands, known as the equatorial belts. These spots have been visible nearly as long as the great red spot, but did not at first attract as much attention. In 1880, however, it was discovered that they moved faster than the red spot, and interest was quickly concentrated on this remarkable phase. Several practiced observers computed the time of their rotation, and found the period five and a half minutes less than that of the red spot. One luminous spot stands out from the others as the most conspicuous of its class, and may still be seen, for a short time, before Jupiter ceases to be an object of present telescopic attraction. Observers have found great enjoyment in watching the white spot as it gained upon the red spot, making, by its independent motion, a whole circuit of Jupiter, relatively to the red spot, in forty-four and a half days. The diameter of the white spot is variable, sometimes reaching nearly five thousand miles. It seems also to be subject to a kind of periodicity, presenting a bright aspect for about fifty-six days, then becoming obscure as if by the passage of clouds, and then resuming its former brightness and moving with accelerated velocity

Mr. Denning has a theory in regard to this spot that deserves careful consideration. He thinks the spot is self-luminous, and emits light; that it is a projection from the real surface of the planet; that it is a permanent feature of the planet, and that it lies far below the level of the dusky belts. If future observations should confirm this theory then we may have a reliable means of ascertaining the period of Jupiter's rotation on his axis, which, according to the bright spot, is 9h. 50m.

It will be seen that Jupiter leaves our neighborhood in a cloud of glory. He will not be of much account as an object of observation for several months to come, as he draws closer to the sun. But when the beautiful summer mornings come, and he shines as a bright morning star, the telescopes of the whole world will be turned upon the beaming star. Intense will be the interest to find out if the luminous spot still shines near the southern equatorial belt, like a permanent projection from the planet; if the great red spot remains unchanged in the southern hemisphere; and if the rosy belt still circles below the northern pole; or if new rifts, belts, and spots are taking the place of those which have become familiar to terrestrial observers for the last three or four years.

All observation points to the inference that we are watching the process of world-making on our giant brother planet four hundred million miles away. Such as Jupiter is now the earth was millions of ages ago, when she was without form and void. Jupiter, thirteen hundred times the earth's size, takes a proportionately longer time to cool off. But, larger or smaller, the planets follow the same inevitable law, development, perfection, decay. Thus, in the perfection of our own planetary development, we may watch the slow process by which our magnificent brother parts with his heat, and takes on conditions that will eventuate in the rudest forms of vegetable and animal life. Millions of ages, as we count time, must pass before he reaches our stage of existence. When that time comes the earth will probably have fulfilled her mission in the economy of the universe, and will have taken her place as a dead world, as the moon has done before her, as the larger planets will do after her. Even the glorious sun must succumb to the same inexorable destiny, when, after the passage of countless ages, his fires cease to burn, the mysterious fuel that now sustains them being exhausted.

We are indebted to *Nature* for our drawings.

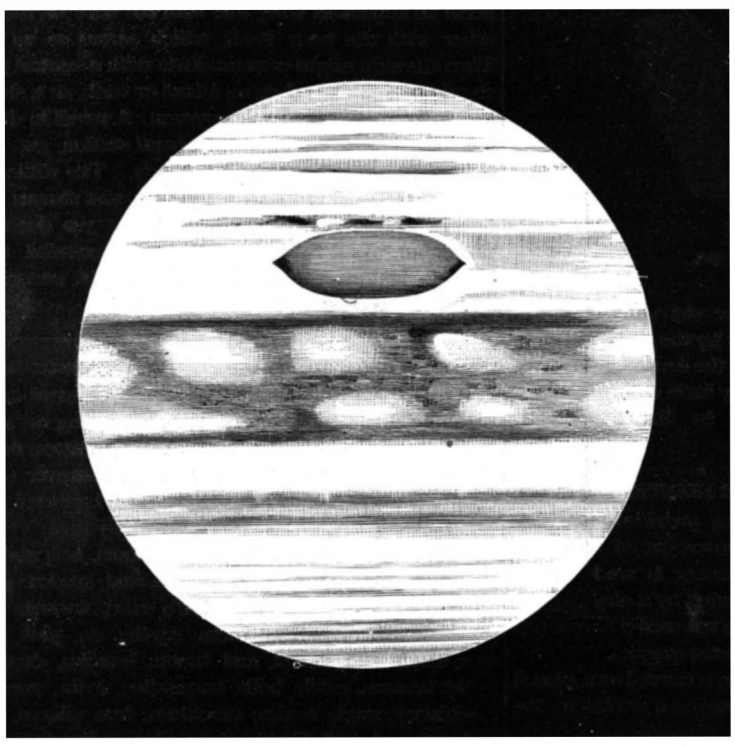

Fig. 1.—The great red spot in transit, December 7, 1881, 10h. 40m. There was a large white patch near the equator under the following side of the red spot. Immediately south of the red spot is a narrow belt with light and dark ovals upon it.

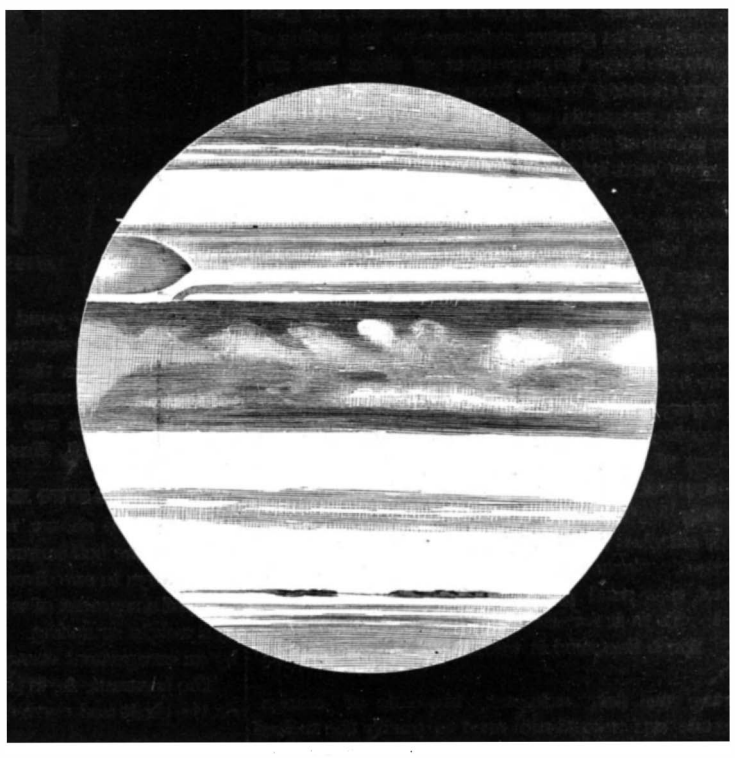

Fig. 2.—The bright spot in transit, December 18, 1881, 6h. 12m. The following side of the red spot is seen on the western limb. To the east of the light spot, and in nearly the same latitude, is a dark mass emerging from the great southern belt.

Fall of a Meteor.

On February 3 a remarkable fall of meteorites occurred in Transylvania. At Klausenburg an intense light suddenly flashed into view at 3:45 P.M. on that day, the sky being perfectly cloudless. The meteor was seen in the northeast part of the sky, and when it disappeared a white cloud was seen in its stead, which spread into a thin streak stretching from west to east. Soon afterward a loud report was heard. The next day the news arrived that near Mocs, about twenty-five miles to the east of Klausenburg, some meteorites had fallen; one of these weighs 35 kilogrammes, and penetrated 68 centimeters deep into the ground. Two other pieces were found near Olah Gyeres, and five others near Vajda Kamaras. Prof. Koch collected no less than sixty pieces of smaller dimensions near Gyulatelke, Visa, and Bare to the north of Mocs. The direction of the meteor was from northwest to southeast, to judge from the position of the fragments; the latter were scattered over a line of about fifteen miles in length.

Luminous Incomplete Combustion of Ether and other Substances.

BY W. H. PERKIN.

The author has observed, when evaporating ether in a shallow vessel on a strongly heated sand bath, on a dark evening, that a pale blue flame was floating about the surface of the sand. On referring to Gmelin's hand book, he found that this phenomenon had been observed by Sir H. Davy. Dobereiner and Bontigny have also put on record similar observations. In the present paper the author has pursued the investigation somewhat further, in order to produce the effect on a sufficiently large scale for lecture purposes. It can be shown by directing a jet of ether (preferably containing 5 to 10 per cent of alcohol) from a wash bottle on to a thick iron dish, heated nearly to dull redness. Ether enters into this luminous incomplete combustion at 260° C., much irritating vapor being produced; the temperature of the flame is so low that it does not char paper or inflame carbon disulphide. If the flame be confined, as by a paper chimney, the temperature soon rises and the ether enters into ordinary combustion. Another very effective method of exhibiting this blue flame is to suspend an iron ball heated nearly to a dull red heat over a dish containing filter paper moistened with ether, when a lambent blue flame surrounds the ball. In all cases a dark room is necessary. Spermaceti thrown on to a heated iron ball gives a similar result. Olive oil, linseed oil, white wax, paraffin, stearic acid, cleic acid, and acetic aldehyde gave blue flames when heated. Methyl and ethyl alcohols and propionic acid also give a feeble reaction. Benzene, toluene, naphthalin, anthracene, formic acid, acetic acid, benzoic acid, cinnamic acid, and phthalic acid gave no result. The phenomenon is probably analogous to that observed at ordinary temperatures with phosphorus. The author demonstrated with complete success the blue flame obtained as above described with ether and spermaceti.

The Blue Color of Water.

The *Photographic News* states that Mr. Aitken has been studying the blue color so characteristic of the Mediterranean and the Lake of Geneva, and his conclusions are embodied in a paper presented last month to the Royal Society. Mr. Aitken begins by saying that two solutions have been offered of this puzzling problem—the one explained the color as due to reflection of small suspended particles which did not reflect the lower rays of the spectrum, and the other that the color was the result of the absorbent action of the water itself upon the white light, before and after reflection of these particles. The latter theory Mr. Aitken holds to be the true one. The smaller the number of white reflecting particles the darker or greener the water appears to be, Mr. Aitken having been successful in turning the still green water of Lake Como into a bright blue by scattering finely-divided chalk in the middle of the lake.

Rubber Stamp Ink.

The following proportions are said to give an excellent ink, which, while not drying up on the pad, will yet not readily smear when not impressed upon the paper: Aniline red (violet), 90 grains; boiling distilled water, 1 ounce; glycerine, half a teaspoonful; treacle, half as much as glycerine. The crystals of the violet dye to be powdered and rubbed up with the boiling water, and the other ingredients stirred in.

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RECENT DECISIONS RELATING TO PATENTS.

United States Circuit Court.—Eastern District of Pennsylvania.

COMBINED PATENTS CAN COMPANY *vs.* LLOYD.

Butler, J., McKennan, J., concurring.

The statute of 1870, relating to reissues, authorizes the insertion of new claims, founded upon the original invention as exhibited by the specifications or drawings, in reissues, when the omission results from "inadvertence, accident, or mistake," and where the claimant has not by some act or omission estopped himself from exercising the right to amend.

The question whether a patent is "inoperative or invalid by reason of defective or insufficient description or specification," and whether such defect has arisen by "inadvertence, accident, or mistake, and without any fraudulent or deceptive intention," appears from the decisions of the Court to be submitted finally to the judgment of the Commissioner wherever the circumstances bring it within the jurisdiction conferred upon him by the statute.

Where additional matter is claimed, however, which does not appear by reference to the patent or contemporary records to be embraced in the invention, or where it appears by such reference that the alleged omission "could not have occurred through inadvertence or mistake," as said by the Court in *James vs. Campbell et al.*, the case is not within the jurisdiction of the Commissioner, and a reissue for additional claims may be declared void.

Where the only mistake suggested is an omission of a claim, and the patentee neglects for thirteen years to file his application for reissue, *Held* that he must be regarded, in view of his conduct, as intending to dedicate such invention to the public, and he is estopped from asserting his claim to such invention in a reissue.

Mr. E. N. Dickerson, for the complainant.

Mr. Henry Baldwin, Jr., for the defendant.

On the 30th day of August, 1864, a patent, No. 43,979, was issued to August Destouy for a new and useful improvement in the manufacture of metal mouldings, in which the claims, two in number, read as follows:

"1. The T-shaped metal moulding, made substantially as and for the purpose specified.

"2. The jaws, B and D D', either straight or curved, and tool, C, constructed and operating substantially as herein set forth, for the purpose of imparting to the mouldings the final touch before they are applied to the article to be ornamented."

On the 17th day of April, 1877, the patent was surrendered, and a reissue, No. 7,609, granted to Herman Miller, with the claims enlarged and multiplied to four in number, the third and fourth, which were new, reading as follows:

"3. The combination, with a table having a stationary jaw or angle, of movable jaws operating, as shown and described, to compress the bent metal against said stationary jaw.

"4. The combination, with a table having a stationary jaw or anvil and movable jaws, as described, of treadles connected with said movable jaws by levers, substantially as and for the purposes herein set forth."

Bill dismissed.

United States Circuit Court.—Northern District of Illinois.

PATENT FEATHER DUSTERS.—NATIONAL FEATHER DUSTER COMPANY *vs.* HIBBARD.

Blodgett, D. J.:

This is a bill in equity, framed under section 4,918 of the Revised Statutes of the United States, for the purpose of setting aside and declaring void a patent issued by the United States to Susan M. Hibbard, for an improvement in feather dusters, dated May 30, 1876, and numbered 177,933, upon the ground that the patentee, Susan M. Hibbard, was not the inventor of the device described in and covered by the patent.

The complainant claims to be the owner of patent No. 154,985, issued by the United States on the 15th of September, 1874, to William H. Curwin, Charles J. Sauter, and William W. Clark, as assignees of George W. Hibbard, for an improvement in feather dusters, and charges that George W. Hibbard is the husband of the defendant, Susan M. Hibbard, and that after the said George had made the invention described in the letters patent No. 154,985, and before the issue of his patent, he sold and assigned his invention and his right to a patent thereto to the parties named therein, to wit, Curwin, Sauter, and Clark, and the patent was duly issued to them as assignees of George W. Hibbard; and that after said George W. had made the invention described in his patent and sold the same, as stated, he and the said Susan M., his wife, colluded together to obtain the letters patent which were issued to said Susan upon the pretext and false assumption that said Susan was the real inventor of the device covered by the first issued letters patent. And the bill prays that the patent so issued to said Susan M. in violation of the exclusive rights of the complainants in the invention therein described may be canceled and set aside.

The peculiar feature which characterizes both these patents is a feather duster made of turkey feathers, or the feathers of our ordinary domestic fowls adapted to such purpose, made pliable by removing the pithy part or body from the stem of the feathers so as to adapt the feathers more perfectly to such use when combined with the other elements to form a duster or brush.

The proof in this case shows conclusively that Mrs. Susan M. Hibbard knew of the fact that her husband had applied for a patent upon this device; knew also that he was poor and unable to pay the expense of obtaining a patent, and that he made the bargain with Curwin and Sauter to advance the expenses and obtain the patent, on condition that they should become half owners thereof. She also knew of the negotiations between her husband and Clark for the sale of the other half of the patent and made no objection to the negotiation, and knew that her husband was to receive what was considered very liberal pay for the remaining half of the patent, and the only objection she ever made to the negotiation was that she insisted that the purchase money to be paid by Clark should be given to her, not because she was the inventor or had anything to do with the invention of the duster to be covered by the patent, but because her husband, being an improvident man, would squander the money, which she wished to use in the purchase of a home for the family. During all the negotiations between her husband and Curwin and Sauter and her husband and Clark she never claimed or pretended, or by any conduct on her part insinuated, that the invention was in any degree her own, but allowed these men to invest their money in the procurement of the patent, and Clark pay for the unsold half of the patent, upon the understanding—to which she seems to have been as fully a party as her husband—that he was the inventor of the duster to be covered by the patent. It seems to me that the proof shows that Mrs. Hibbard, in allowing her husband to deal with Curwin, Sauter, and Clark as the original and first inventor of this device, has so far conceded or admitted him to be the original inventor thereof as that she should be estopped from now claiming otherwise, and especially claiming that she and not her husband was the inventor. If there were no other features in the case, therefore, than the conduct of Mrs. Hibbard toward the persons with whom her husband dealt, I should think it enough to cancel this patent as against the patent previously issued to him.

But the case is, perhaps, susceptible of solution upon another ground. It appears from the proof that George W. Hibbard, for some time prior to the alleged invention described in his patent, had been engaged in the manufacture of dusters from turkey feathers by setting them in their natural condition into a handle, so as to make a brush or duster; that some little time prior to the 10th of February, 1874, he conceived the idea of making a better duster by softening the stems of turkey feathers and rendering them more pliable, so as to make a feather duster which would supersede or take the place of dusters then and theretofore made from ostrich feathers, his idea being that if he could make turkey feathers or the feathers of our common fowls pliable he could use them in place of foreign feathers and make as good if not a better duster. He experimented some time in this direction with chemicals for the purpose of softening the stem or rib of these feathers, and, not succeeding to his satisfaction in any of these experiments, was discussing the subject on one occasion with his wife, when she suggested to try cutting or shaving down the stem of the feathers, so as to make them pliable and limber. The suggestion was at once acted upon and a duster made which proved satisfactory, and the patent issued to his assignees was obtained for this device as the invention of George W. Hibbard.

Mrs. Hibbard's sole claim to the invention covered by her patent, which is the same as that covered by the patent of her husband, is that the suggestion or idea of cutting or trimming these feathers down so as to make them limber first came from her, and upon this fact she claimed and obtained the patent in controversy.

The specifications and claims in the two patents are substantially the same, and are for:

"As an improved article of manufacture, a feather duster having the stems of the feathers split longitudinally, and a part thereof severed from the remaining part, substantially as specified."

The patent, it will be seen, is for this new article of manufacture—namely, a feather duster made of split feathers. It is not upon split feathers as such or upon the process of splitting feathers, but upon a combination of the split feathers with the other elements by which a duster is made. The idea of a feather duster, to be made of feathers of the common turkey or other domestic fowls, seems clearly to have originated with George W. Hibbard. The *desideratum* was to make these feathers pliable. He was seeking to accomplish this when the suggestion was made to him by Mrs. Hibbard to try cutting or splitting them. The proof on the part of Mrs. Hibbard fails to show, indeed it falls far short of showing, that she ever made a feather duster or thought of making one from turkey feathers made pliable by splitting them until after her husband had been for some time at work in that direction. The most the proof does show is that she suggested the mode of making feathers limber and pliable which were used for the purpose of making the feather dusters described in this patent. The successful feather duster covered by both these patents was, it seems to me from the proof, the invention of George W. Hibbard. While he was experimenting—I may say, perhaps, groping—for some method of rendering his feathers pliable, Mrs. Hibbard suggested the experiment of splitting the feathers. He acted upon that suggestion, and finding that the feathers were thereby made pliable, combined them with the other material and made the feather duster which before that time had only had existence in his mind. Although Mrs. Hibbard may have made a valuable suggestion in the progress of the experiment, yet that does not make her the inventor. (*Agawam Company vs. Jordan*, 7 Wall., 602; *Pitts vs. Hall*, 2 Blatchf., 229.)

For these reasons, but mainly upon the ground of the estoppel, which I think the most cogent, the bill of the complainant will be sustained and a decree entered setting aside the patent issued to Susan M. Hibbard.

Inauguration of the Sibley Mill, Augusta, Ga.

An interesting event in the history of cotton manufacturing in Augusta, Ga., took place on Wednesday, February 22. On that day, in the presence of a large number of invited guests and interested spectators, the head gates of the canal were raised, water turned on, and the entire machinery of this magnificent structure was set in motion. The Sibley Mill is without doubt the most elegant as well as the most thoroughly equipped mill in the South, and, in fact, in all the details that go to make up a handsome, complete, and convenient mill it has no superior in America. The main building is 530 feet long, 76 feet wide, and four stories high, with commodious picker house, dye house, finishing room, and store house. In the construction and arrangement of these buildings the greatest possible attention has been given for the convenient and economical handling of the cotton, from its arrival on the premises till its departure in the shape of manufactured goods. On the upper floor is the opening and mixing room, with a capacity for 50 bales of cotton, the floors being laid with slate to allow the dirt to fall through. On this floor also is the warping and spinning machinery. The third floor is occupied by the cotton bins and picker rooms, in which are four breaker and four finisher pickers, from the works of the Kitson Machine Company of Lowell, Mass., separated by a substantial brick wall from the card room, which contains eight double sections of nine cards each, in all 144 Foss & Pevey cards. The second and first floors will be occupied by 1,000 looms, about 200 of which are Crompton's fancy looms; the others, together with the carding, spinning, and warping machinery, being built by the Lowell Machine Shop, Lowell, Mass. The rooms are all high, well lighted, admirably ventilated, and fitted with every convenience for the comfort of the operatives. In front of the main entrance stands the office building, a handsome two story structure, having on the first floor offices for the president, superintendent, and general business, and on the upper floor a capacious designing room. In front of the office stands, as a monument of the past, the giant chimney of the Augusta Powder Mills, the property of the Confederate Survivors' Association, standing guard over an industry of peace, as it once did during the manufacture of munitions of war. Near by the main building, and overlooking the grounds, is the residence of the superintendent, and at the other end of the mill are six brick tenements for the overseers, while across the canal the company has fifteen acres of land on which are built twenty houses of four tenements each for operatives. The capital stock of the company is $1,000,000. The officers are William C. Sibley, president; Jones S. Davis, superintendent. Mr. Davis is well known among northern manufacturers.—*Industrial South.*

On the Electric Transmission of Power to Great Distances.

BY MARCEL DEPREZ.*

Such experiments as have been made on the transmission of power by electricity have always been to short distances.

In the Noisiel applications the distance did not exceed three kilometers, the two stations being connected by cables of feeble resistance.

In the different applications known there has never been a power greater than that of six to eight horses transmitted to a distance of five kilometers, with machinery weighing about 500 kilogrammes.

It has often been asserted that transmission to great distances is impracticable. It may be interesting, then, to state an experiment that I have recently made.

With Gramme machines of a small type, weighing about 100 kilogrammes, and modified according to principles that I have indicated, I have obtained an effective power of 37 kilogrammeters, the resistance interposed between the motor and receiver being 786 ohms, representing a distance of 78·6 kilometers of ordinary telegraphic wire.

In order to bring this result into stronger relief I place the different elements of this experiment side by side with those of an analogous experiment made by Mr. Fontaine with larger machines, and the results of which he has published:

	Velocity.	Effective Power.	Power per Revolution.	Performance	Resistance Interposed.
	Revolutions	Kgm.	Kgm.		Ohms.
Fontaine ..	1,570	21·5	0·8	0·38	4·65
Deprez.....	2,300	38·0	1·0	0·25	786·0

This transmission took place without the occurrence of any spark on the brushes, the machines remaining perfectly cold, and without there having been any necessity of taking special precautions for the insulation of the conductors.

The result of 0·25 obtained is only that derived from the first experiment. I have not yet had time to study the best conditions of velocity, of static effort, and of electromotive power. There is nothing theoretically to prevent the result reached being better, and I am certain of soon realizing it. However, I have thought it well to announce now, without waiting any longer, a result in electrical transmission which has hitherto been considered as impracticable.

* Note communicated to the Academie des Sciences, February 13, 1882.

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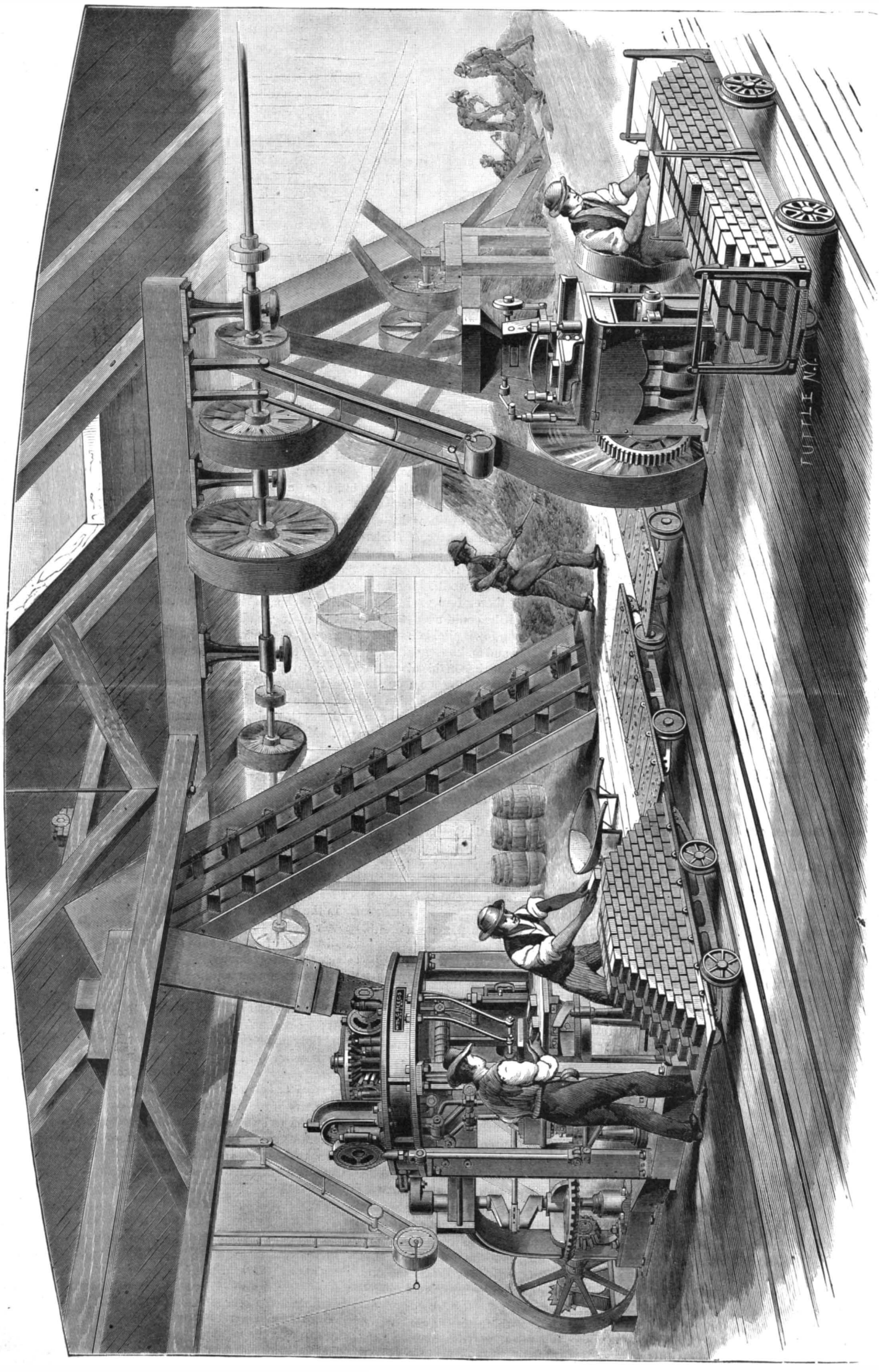
NEW SYSTEM OF BRICK MAKING.

In brick making, as in all other industries where the demand is great and rapidly growing, machinery is replacing hand labor, and as a result it is not only possible to bring the rate of production up to the demands of the market, but the quality of the product is vastly superior to that of the best hand-made article, and with the system illustrated the quality of brick manufactured is far in advance of the product of other machines. Bricks made by machinery have been commonly deficient in strength, unequal in size and density. The Gregg triple pressure and combination brick machine, shown in our engraving, possesses new and valuable features, which insure a yield of bricks superior to the best hand-made, and at a comparatively small cost. These bricks are superior in appearance, and in the matter of homogeneity and strength they are beyond all doubt far ahead of any other brick made.



GREGG'S NEW SYSTEM OF BRICK MAKING.

The following report of tests made by General Q. A. Gillmore shows the extraordinary strength of these bricks:

UNITED STATES ENGINEERS' OFFICE,

Wm. L. Gregg, Esq.:

DEAR SIR: I have the honor to state that some tests have been applied to the bricks received from you with very satisfactory results.

The bricks possess remarkable density, hardness, and compressive strength.

The tests made and the results obtained are given below:

FIRST TEST.

Three bricks were placed together without mortar, one above the other, flatwise, making a pile 8 inches long, 4 inches wide, and 6⅜ inches high, the upper and lower sides of each brick being rubbed to secure good contact.

The pile was then subjected to a pressure of 100,000 pounds, without cracking or disturbance of any kind. Surface pressed, equal to 32 square inches (4 × 8).

The pile was subjected to pressure between thin pine cushions, one below the lower brick and the other above the upper one.

SECOND TEST.

Three half bricks, making a pile 4 inches by 4 inches and 6⅜ inches high, were then subjected to pressure between wooden cushions. Area of surface pressed, 16 square inches (4 × 4).

The pile crushed at 90,000 pounds, or 5,625 pounds to the square inch.

THIRD TEST.

Some two inch cubes were cut from the bricks, and crushed separately, with the following results:

No. 1 crushed at 40,000 pounds; equal to 10,000 pounds to square inch.

No. 2 crushed at 37,000 pounds; equal to 9,250 pounds to square inch.

The above were crushed between steel plates.

No. 3 crushed at 37,000 pounds; equal to 7,750 pounds to square inch.

No. 4 crushed at 30,000 pounds; equal to 7,500 pounds to square inch.

Nos. 3 and 4 were crushed between one-quarter inch pine cushions.

The crushing strength of these bricks is greater than that of any bricks ever tested by me.

Very respectfully, your obedient servant,

Q. A. GILLMORE,
Lt.-Col. Eng'rs, Bvt. Maj.-Gen.

Similar tests were applied by direction of the Supervising Architect of the United States, at the Treasury Department, Washington, with the same results, and the bricks were ordered to be used in the government work.

Heretofore in the construction of bricks by machinery, and especially face or front bricks, it has been found practically impossible to supply an equal amount of clay to each of the mould boxes. This results in unequal size and density in the bricks, and when but one pressure is imparted to the clay, as in ordinary machines, the bricks are often defective in strength, at the corners and edges especially, and hence unsuitable for use as first quality front or face bricks. These serious objections have been overcome by Gregg's brick machines.

The mechanical construction of these machines is such that the heavy developing pressures take place while the mould table is at rest, thus requiring but a nominal amount of power to operate them, and avoiding strain, wear and tear, and breakage, as well as the great loss of power common to other machines.

Brick machines may properly be classified under three heads: dry clay machines, slush machines, and crude or moist clay machines.

From the peculiar construction of dry clay machines where "filler boxes" or graduating measures are used to fill the mould boxes, the clay must be dried and granulated to fill with any degree of regularity into the "filler boxes," and thence into the moulds. And when moulds are grouped together it becomes a physical impossibility by the dry clay system to fill them alike, hence those deficient in clay will but partially develop the bricks; this, added to the fact of the cohesive quality of the clay being destroyed by extracting the moisture before moulding, complete vitrifaction cannot take place in the burning, and the result is that bricks made from the dry clay disintegrate with the action of the

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elements. In the manufacture of slush brick the other extreme is met. To facilitate moulding in the "hand way" a large portion of water is added, and the bricks being so soft must be spread upon floors to dry. The slow out-door process of drying, or evaporation, is one of the most favorable processes for the hand brick maker, but it requires the continuous insurance of favorable atmospheric influences, and a continuity of fair weather, which practically can never be relied on.

Clay, to be made into bricks by hand moulding, must of necessity be so wet that at least 25 per cent of water must be evaporated before it is safe to burn, so that in fact, in works producing 30,000 bricks per day, upwards of 23 tons of water have to be evaporated therefrom every twenty-four hours—the labor attending which being an expensive item, and the bricks being rendered porous by the operation.

Gregg's triple pressure and combination brick machines occupy a medium position between dry clay and slush machines; thus a first great saving is effected, as the machines accept the crude clay, and manufacture it to advantage in so stiff a state as not to contain more than one-eighth the above amount of water to be evaporated, and yet all of its cohesive qualities are retained. The fusion being complete, the bond between the particles is perfect and the bricks are less porous, consequently stronger, and absorb less moisture when burned.

After being pressed, the bricks are placed on iron cars and passed through a drying tunnel, where they are dried with regularity, not being subjected to rains and atmospheric changes as by the old out-door system: they are then passed directly to the burning kiln, and are there burned and made ready for the market.

The great benefit to be derived by operating this system is not only the economy and regularity of the manufacture, but the increased value of the product. By keeping a strict account of the cost of manufacturing 1,000,000 bricks by the old system and a similar account of a like number made by the Gregg system, it will readily be seen that they can be made by the latter process at one half the cost of the former, as well as at all seasons of the year, and be worth twice as much in the market as a kiln of ordinary brick.

The Gregg machines have obtained a world-wide reputation at the various expositions, both in this country and Europe, where they have invariably received the highest awards.

Mr. Wm. L. Gregg, the inventor of this system, has organized in New England the "New England Press Brick Manufacturing Company," having offices in the Equitable Building, Boston, Mass. The works of this company are capable of turning out 100,000 bricks per day, this being the largest production of fine bricks made in any of the Eastern States.

This establishment is specially fitted with machines for turning out the finer grades of brick for fronts, mouldings, cornices, etc., ornamental and shape bricks.

Our engraving gives a good idea of the interior of the establishment, beside giving much of the detail of the machinery

All inquiries should be addressed to the Gregg International Brick Machine Company, Equitable Building, Boston, Mass.

TAPIR AND YOUNG.

The first tapir known to have been bred in Europe was born in the London Zoological Gardens, February 12. It is a cross between the two principal American species, the mother (*Tapirus americanus*), from Brazil, being a brown animal, and the father (*T. roulini*), from Colombia, having black hair. The young one, like all young tapirs, is curiously lined and spotted with white on a ground of bright fawn color. The time of gestation was fourteen months. The young one is a lively little fellow, about the size of a roasting pig, and appears to enjoy life amazingly. When but a day old it readily entered the water, and when not following its mother about it frequently indulges in a swim. The white markings will probably disappear when it is about a year old.

The tapir is a pachyderm, one of the links which unite the elephant with the wild boar and rhinoceros.

The snout of the animal forms a small proboscis not unlike the elephant's, but much smaller, and minus the finger-like tip. It has the appearance of a trunk cut short.

The American tapir is a great swimmer and haunts wooded parts on the margins of streams; it is powerfully built, and has the merest apology for a tail.

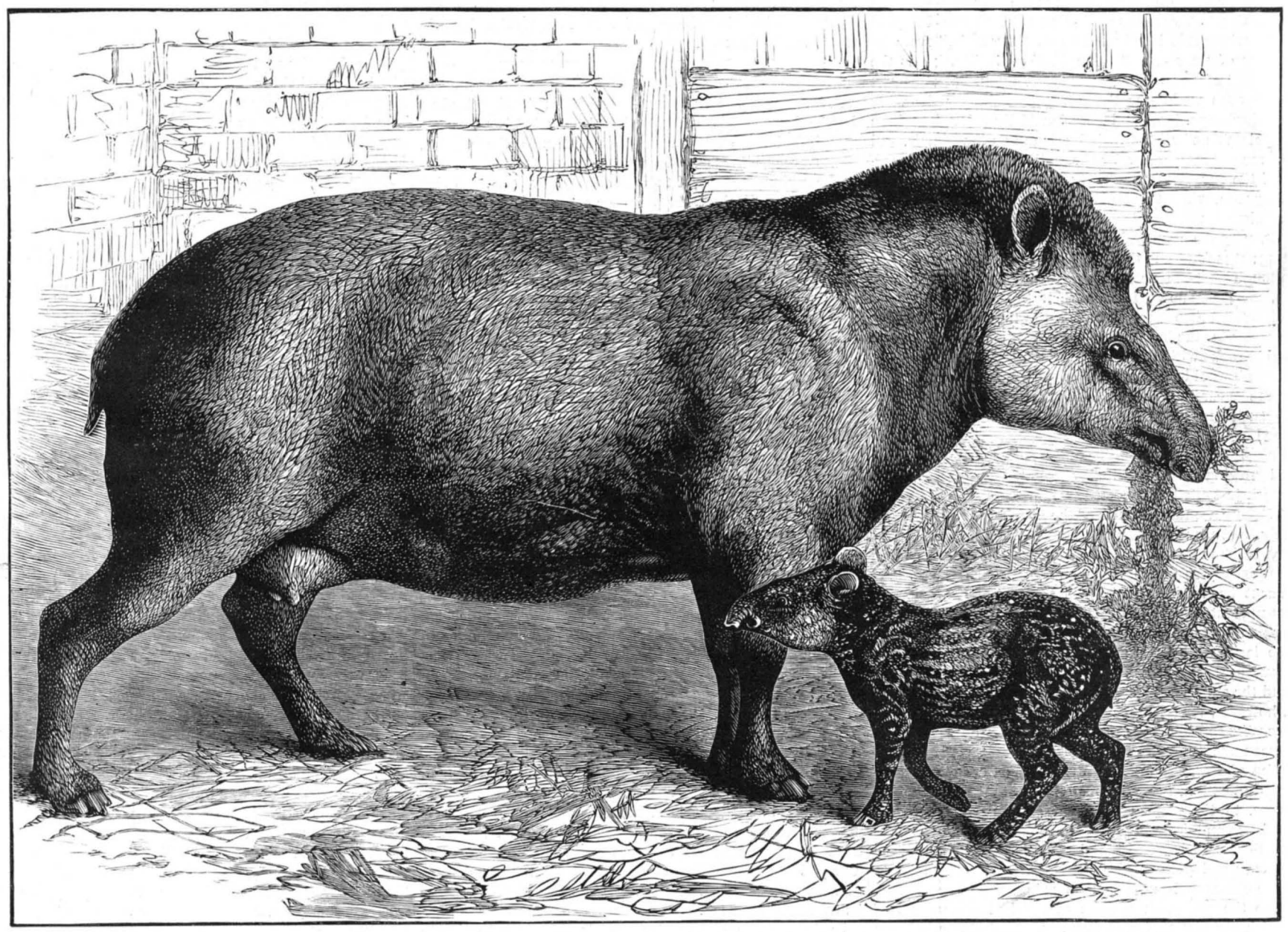
The food of the tapir consists of leaves, young shoots of trees, native fruits, and probably submerged water plants and other vegetable matter. It often does much damage to the manioc plantations of the natives. The flesh is good to eat, though somewhat dry and tough. The tapir is much hunted by the Indians, who watch for their large but timid game from platforms built among the trees overlooking the animal's feeding places.

The tapir is of a very gentle disposition, and becomes quite affectionate in confinement, which may be observed with the specimens now in the Gardens; the attentive young keeper moves about among them as if they were sheep. The tapir is a different animal if hard pressed, and becomes a formidable opponent; he does not always come off second best. He goes in search of food by night, is very shy, and has wonderful powers of hearing and scent. The jaguar is its most formidable enemy.

There are now several known species of tapirs, such as the *Tapirus americanus, T. laurillardi, T. malayensis, T. roulini, T. sumatranus, T. indicus, T. bairdi.*

The Sumatran tapir has a white band encircling the body; the Brazilian and Colombian tapirs have a stiff bristly mane; the Malayan has none. The *T. bairdi* is found, it is said, only on the Atlantic side of the Isthmus of Panama.

For our handsome illustration we are indebted to the London *Illustrated News.*



THE NEW-BORN TAPIR—LONDON ZOOLOGICAL GARDENS.

New Variety of Silk Moth.

BY W. MARTIN WOOD.

On behalf of both entomologists and sericulturists, it seems desirable to make some further mention of the fertile hybrid silk-moth—result of a cross between the *Yamma-mai* of Japan, and the *Tusser* moth of the Deccan—first produced at Bombay about seven or eight years ago. It is not mentioned by Mr. Wardle in his valuable "Handbook of the Collection Illustrative of the Wild Silks of India," though that bears date so late as July last year. Besides, this new silkworm, though specially reared, comes under the definition given by Mr. Wardle in his opening sentence: "The term 'wild silks of India' must be regarded as applying to all species of silk other than that produced by the *Bombyx mori*, the worm which feeds on the mulberry leaf." The primary advantage of this new high-class silk spinner is in its being able to feed and thrive, not only on the bhair tree (*Zizyphus jujuba*), as mentioned in my remarks the other day, but on almost every variety of the *ficus*—probably on all the trees mentioned by Mr. Wardle (p. 15) as furnishing food to the "Tusser" worm. Thus the new worm might be diffused over the greater part of India without any planting preparations being required. The Japanese progenitor of the hybrid is known as the "oak-feeding" silkworm, so that may partly account for the omnivorous character of the creature, although experience may show that carefully selected diet will improve the quality of its silk. The new variety might be provisionally designated *Yamma-paphia mowisia*, thus preserving the name of the ingenious sericulturist, Mr. Paul Mowis, who developed the hybrid, and tested its value through several seasons. Having myself seen the creature during all its stages, from egg to moth, I can testify to its healthy appearance, its fertility, and productiveness. Some millions of its cocoons were, I understood, sent about 1878, to be reeled and worked up at Bradford. The silk is finer than that of the Tusser, and nearly as strong; so that if the worm can be reared and fed on the same plants, and with as little trouble as the coarser Tusser worm, then there should be a very distinct gain in the most valuable quality of silk produced. Mr. Mowis is, at present, carrying on his sericulture somewhere in the railway reserved forests of H. H. the Nizam's dominions; and, no doubt, information could be elicited from him on the subject. He had given much attention to the practical chemistry of sericulture in trying to hit on the best methods of removing the mucilaginous matter from the worms, and in preparing the fiber for dyeing.—*Journal of the Society of Arts.*

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NATURAL HISTORY NOTES.

As to the Parasitism of Beech-drops.—That curious plant, *Monotropa hypopitys*, common to Europe and America, and commonly known as "beech-drops," "pine sap," and "bird's nest," has been examined by Dr. F. Kamiensky, who gives it as his opinion that it is not, as has generally been supposed, a true parasite, inasmuch as it possesses no true haustoria, but a saprophyte, that is, a non-chlorophyllaceous plant growing in humus. The root fibers appear to be invariably clothed with a dense weft, consisting of the mycelium of a fungus, which covers the extremity of the root fibers like a cap, it is not, however, parasitic on the roots. The fact of the mycelium always accompanying the root of the plant seems to point to some relationship between them worthy of investigation.

The results of Dr. Kamiensky's investigations accord perfectly with those reached by Prof. Jos. Schrenk, of the Torrey Botanical Club of this city, who has had this same plant under investigation for the last two years. Here, as in Europe, the roots of the plant are found to be involved in a mycelium, with which are intermixed spores that have been detected in the act of germination (if that which contains no germ can be said to "germinate"). No connection has as yet been discovered between the roots of the plant and those of the trees under which it grows, and its parasitism appears doubtful.

Toughness of the Egg-shells of an Arctic Bird.—Mr. H. W. Elliott, in his "Monograph of the Sea Islands of Alaska," says that the thick-billed guillemot is the only egg bird that has the slightest economic value to man on the Pribylov Islands, where it is locally known as the "arrie," from its harsh cry of "arra-arra." The bird in bodily size is the counterpart of our ordinary barnyard duck, but it cannot walk or even waddle as the domestic swimmer does. It lays a single egg, large and very fancifully colored, and the most palatable of all the varieties found on the islands, and hence much sought after by the natives. A large proportion of the eggs become so dirty by rolling here and there in the guano, while the birds tread and fight over them, as to be almost unrecognizable. "I was struck," says Mr. Elliott, "by the happy adaptation of nature to their rough nesting; it is found in the toughness of the shell of the egg—so tough that the natives, when gathering them, throw them, as farmers do apples, into their tubs and baskets, on the cliffs, and then carry them down to the general heap or collection near the boat's landing, where they pour them out upon the rocks with a single flip of the hand, just as a sack of potatoes would be emptied; and then again after this they are quite as carelessly handled when loaded into the 'bidarrah,' sustaining through it all a very trifling loss from crushed or broken ones."

Curious Willow Trees.—The only suggestion of a tree found growing on the Pribylov group, says Mr. Elliott in the work just cited, is the hardy "talnuk," or creeping willow. There are three species of the genus *Salix* found here, namely, *S. reticulata*, *S. polaris*, and *S. arctica*. The first named is the most common and of largest growth. It progresses exactly as a cucumber vine does in our gardens. As soon as it has made from the seed a sprout of six inches or a foot upright from the soil, then it droops over and crawls along prostrate upon the earth, rocks, and sphagnum. Some of the largest talnuk trunks will measure eight or ten feet in recumbent length upon the ground, and are as large around the stump as an average waist of a man. The usual size, however, is very much less; while the stems of *polaris* and *arctica* scarcely ever reach the diameter of a pencil, or the procumbent length of two feet.

Action of Parasitic Fungi.—Mr. Maxime Cornu has recently called attention, in a note read before the Academie des Sciences, to the curious fact that several parasitic fungi cause fallen and decaying leaves to remain green at the spots where they have attacked the plant, when all the rest of the leaf has turned yellow. Microscopical examination shows that the chlorophyl in these spots is in a normal condition, while in the yellowish portion of the leaf it is formed of yellowish globules of altered form. The irritation produced by the parasite preserves the vital activity of the cells from which it derives its nourishment. He considers that this fact throws additional light on the theory that a lichen is an alga stimulated into continued and vigorous growth by the presence of a parasitic fungus.

The "Overflow Bugs" of California.—The following extract from a note from one of Prof. C.V. Riley's correspondents, communicated by him to *Nature*, is interesting as showing how ground beetles, which are usually beneficent to man, may at times become a great nuisance. The insect popularly called an "overflow bug" in California, is, scientifically, the *Platynus maculicollis*. We lived, says the correspondent, in Fresno county two years. It is hot and dry there, thermometer ranging from 96° to 108° for about three months. In June and July, when hottest and driest, the "overflow bugs" filled the air between sunset and dark. One could not with safety open his mouth. They would light all over one's clothes; they filled the house; they swarmed on the table, in the milk, sugar, flour, bread, and everywhere where there was a crevice to get through. They were flying for about two weeks, and then they disappeared mostly or did not fly much, but were hidden under papers, clothing, and in every available place. They were all through the foot hills the same, and much the same in Los Angeles, about Norfolk, but they did not fly much in the latter place. In Los Angeles they seemed to be worse before the "Santa Annas," a hot wind from the desert filling the air with sand. Chickens, no matter how hungry for insects, refused to eat these pests. The visitation of these insects formed a veritable plague.

The Crow.

Professor Linden said a good word the other day at Buffalo for that much persecuted bird, the common crow, *Corvus americanus*). The crow of America belongs to a scattered family of about two hundred species, including among them the buzzard, jay, raven, and magpie. Of the genus proper to which the crow belongs, seven examples are found in the United States, the great black raven being at the head. In the wilderness, about one hundred miles from Buffalo, on the shores of Lake Ontario, ravens were found. Their nests were so secluded as rarely to be discovered. So wary were the birds that Mr. Linden had found it impossible to obtain a specimen. They were reported more abundant on the Canada shore of Lake Ontario, but it was impossible to procure a specimen even there, though a liberal reward had been offered. The crow was only preserved from annihilation by its great cunning. Even in captivity the bird displays a degree of sagacity which almost resembles human intelligence. Mr. Linden admitted that the crow could hardly be called a sweet singer, still, when tamed, he made a very interesting pet. On the whole, he might safely be set down as a useful bird and a real friend of the farmer. He eats large quantities of noxious insects, and though he has a bad habit of pulling up young tender shoots of grain, it was a question whether the damage was not more than compensated by the number of larvæ of beetles thus brought to light and devoured.

Occupation for the Insane.

A reporter of the *Tribune* recently visited the City Asylum for the Insane on Ward's Island, to learn what has been accomplished there in providing occupation for the patients. There are usually somewhat more than a thousand patients in the asylum. Many of them are not only insane, but sick and under medical treatment; some are too feeble to do any work; some are too violent, and some are too imbecile. But, after subtracting all these classes, there are left a large number who have the intelligence, the strength, and the skill necessary to make them valuable in the workshop. In regard to the employment of such persons as these, Dr. Macdonald, the superintendent, gave the following facts from his experience:

Out of the 1,200 or more patients, about 400 are available for work. In this estimate those who do light chores in the building are not included, but simply those who pursue some regular calling for seven or eight hours a day. It might be supposed that they would manifest some unwillingness to work; but, on the contrary, they often show much enthusiasm. Of course much care must be exercised in selecting men for occupations which require the use of tools. But only the most docile and intelligent are chosen for these departments, and they are carefully searched every night to see that they have secreted no tools. It sometimes happens that patients become sullen or flighty, and refuse to work. In such cases they are allowed to remain idle until the spell passes away, when they are glad to begin again. In the mechanical departments, of which more will be said further on, a sane foreman is employed who directs the workmen. Though they are fond of employing themselves, yet, with the capriciousness of lunatics, they soon grow weary of doing the same thing all the time. And so recreation of some kind is necessary. They are therefore taken out for walks, or allowed to play football in the yards, or to play a sort of quoits in the halls, which consists in pushing a round wooden disk over the smooth floor, the object being to make it land in a chalked circle. There is also a pleasant amusement room, with a stage, in which concerts, plays, and readings are given from time to time. The patients enjoy these entertainments with all the delight of children. In fact, in their work and play they have to be treated as children.

In the selection of work for patients, the aim is to give to each the work he is used to if possible, or something related to it. There are more than one hundred callings represented in this asylum, and it would be obviously impossible to start them all going here. What we aim at is to have a few of the more common trades in practical operation. For instance, all the carpenterwork and bricklaying and general repairing of the Asylum are now done solely by the patients. That of itself is no small item. In the kitchen the only salaried person is the cook; his twenty or more assistants are patients. The engine and boiler-room, one of the largest in the city, is attended to entirely by patients. It is not thought safe to employ patients as barbers, but their assistants are patients. In the summer about one hundred and fifty patients are engaged in farm work.

In the mat room the visitor saw fifteen patients, principally old sailors, working busily. In the tailor-shop there were twenty-five, who make all the clothes worn in the institution. The only salaried man is the foreman. Twelve were employed in the shoe-shop, seven in the tin-shop, and about fifty in the paint-shop and carpenter-shop. The latter do all the painting and repairing required in the institution. A printing room has been recently established. The department printing has heretofore been done at Bellevue Hospital by prisoners, but was not done satisfactorily. The Board of Charities and Correction lately passed a resolution transferring the printing bureau to the City Asylum for the Insane, and presses are now put up there. Dr. Macdonald says that he hopes in time to be able to do not only the department printing, but much of the corporation printing—perhaps even the *City Record*.

He thinks this is entirely practicable, as next to cigar makers printers are more numerous in the asylum than men with any other trade. If this plan should ever be realized it would save the city a large sum of money in printing. In this shop, also, the visitors were not noticed even by a look About a dozen men were engaged in putting a large printing press in position, and seemed more eager to do their work than the sane foreman who was directing them. A few compositors were at work before their cases on circulars and department specifications.

"We have about twenty-five men at work here now," said the doctor, "and when we get set to rights will have many more. As you see, the printing office is over the steam laundry, and we will run it entirely by steam. We shall print all the official matter of the department, and, as we get stronger, I shall ask the city to send its printing up here. I have also a novel idea in view—a weekly paper entirely composed, edited, published, and set up by lunatics. Of course in a quiet way I shall exercise a sort of censorship of the press; but all the articles that will appear in it will be written by the patients. And I will venture to say that it won't be such a very crazy paper either."

Dr. Macdonald finds that the great majority of patients are happier and more docile when employed, and he is satisfied that they are capable of doing many things which they have hitherto been supposed unfit for.

Oil of Turpentine as a Disinfectant.

In a lengthy paper upon the disinfectant which can be obtained by shaking oil of turpentine with water, Rennard sketches the history of ozone and peroxide of hydrogen. The following points will be found interesting at the present time when so many so-called ozone compounds are before the public.

The bleaching properties of certain essential oils, especially of oil of turpentine, which is seen in its effect upon the corks of bottles containing it, must have been known for a long time. It was first explained by Schoenbein, the discoverer and chief investigator of ozone. In 1851 he stated, in the *Journal fuer prak. Chemie*, that the bleaching of the corks in turpentine bottles was due to the oxidizing action of the oxygen which had been excited or rendered active by the oil, and he proposed to restore old paintings with oil of turpentine, which must act like the peroxide of hydrogen discovered in 1818 by Thenard, and recommended for this purpose. Schoenbein also tested the oxidizing power of the ozonized turpentine oil in other ways. He said that it decolorized litmus and indigo solution, and turned paper blue after it had been impregnated with iodide of potassium and starch. In 1853 Williamson divided essential oils into two classes, those which are ozonized and those which are not, and in the former he placed oils of turpentine, lemon, lavender, peppermint, etc. At first Schoenbein was of the opinion that the oxygen excited by oil of turpentine was identical with the ozone formed by electricity or moist phosphorus. After Houzeau (*Poggendorff's Annalen*, 1856) obtained from peroxide of barium and sulphuric acid a gas that he thought was identical with ozone, Schoenbein followed up the investigation further and found that it was not so. In a long paper contributed to the *Annalen*, in 1858, he showed that when hydrochloric acid acted upon peroxide of barium, or one of the alkalies, only peroxide of hydrogen was liberated, but never chlorine. On the other hand the peroxides of the heavy metals always yielded chlorine with hydrochloric acid. Hence the active oxygen got from the peroxides of one class must differ from that obtained from the other class. That got by electrolysis or phosphorus agreed with the one obtained from peroxides of the heavy metals. To distinguish one from the other he called the active oxygen that forms peroxide of hydrogen autozone, to distinguish it from the negative form already called ozone

In the same year, 1858, Schoenbein proved that ozonized oil of turpentine, that is, that which had long been exposed to the air, contained autozone, and in contact with water formed peroxide of hydrogen.

In 1866 we find it stated that the camphenes in general, but especially oil of turpentine, juniper, copaiba, camphor, and lemon, also benzole, and the hydrocarbons of petroleum, oil of cinnamon, peppermint, and caraway, cod-liver oil, and croton oil, in contact with water form peroxide of hydrogen. Oil of juniper excels turpentine in this respect.

This discovery seemed to be overlooked until 1873, when Dr. Radunowitsch and Charles Kingzett recommended turpentine water as a good disinfectant and antiseptic. Before this, turpentine had been used in making dry albumen from blood, in bleaching ivory and bones, etc. A solution of peroxide of hydrogen was used in Paris to bleach the hair, and turpentine water can be employed for the same purpose.

Radunowitsch published his investigations in the proceedings of the Russian Chemical Society, in 1873. He assumed that ozone is formed by the slow oxidation of oil of turpentine, but that it escapes with the vapors, while the peroxide of hydrogen remains in solution. To obtain as much peroxide of hydrogen as possible, he mixed equal volumes of water and oil, and exposed the mixture to sunlight, shaking often. In three days the lower layer of water was acid, and gave with different reagents the reaction for peroxide of hydrogen. Radunowitsch recommended the solution for disinfection, and employed it for some time in the hospital for cleansing gangrenous wounds.

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Kingzett published his experiments in 1874 in the *Journal of the* (London) *Chem. Society*. At first he assumed that by the oxidation of oil an organic peroxide was first formed, and when treated with water this was decomposed with camphoric acid and peroxide of hydrogen. He found that at the end of fifty-four hours there were 45 parts of peroxide of hydrogen in 10,000 of the solution, or nearly one-half per cent. He also demonstrated the antiseptic and disinfectant power of the solution; 5 c.c. of a quarter per cent solution kept 50 to 100 c.c. of milk, eggs, etc., a long time.

Kingzett, in a second paper, published in 1876, refers the hygienic influence of pine and eucalyptus trees to similar causes, that is, the continual oxidation of their essential oils and formation in the air of peroxide of hydrogen. He also said that patients recover more quickly in wooden hospitals for like reasons He says that the solution contains none of the oil of turpentine, that it is not poisonous, and will not injure linen garments or fabrics. It does not attack utensils and tools, and is completely volatile.

In making turpentine water freshly distilled oil is not so good as the old that is partially changed to resin. Rennard, in his experiments, mixed Russian turpentine, that had been several years in the laboratory, with water, in the proportions of one to ten, twenty, and thirty. They were kept in open bottles, and often shaken. The amount of peroxide formed in the first three days was small, but gradually increased; the oil turned yellow. The chromic acid reaction was used in testing for peroxide of hydrogen. The clear-filtered solution was acidified with a few drops of dilute sulphuric acid, ether poured on it, and then a few drops of a solution of chromate of potash added and shaken. If peroxide of hydrogen is present, the ether becomes more or less blue. The longer it is exposed to the air the more peroxide is found in the solution. A quantitative estimation of the peroxide of hydrogen was made by adding permanganate solution until the last drop caused a pink color that lasted a few seconds. Samples of different ages were found to contain from 0·3 to 2·8 per cent.

Jacobsen says that a very active oil of turpentine is obtained by mixing one part of rectified oil of turpentine with three parts of absolute alcohol in a loosely closed vessel. It is left a few weeks in the sunshine, then the alcohol is allowed to evaporate. The resinous mass that remains when shaken with water forms a powerful bleaching liquid.

This subject has an additional interest in this country from the fact that a manufacturing chemist in the West is now selling a substance labeled "aromatic ozonized liquid," which is strongly acid, has an odor of essential oils, and probably contains oils of turpentine, wintergreen, etc., in the active or ozonized condition. I. B.

Lac.

Lac is one of the many useful productions of the Indian Empire; it is also found in large quantities in other parts of the Asiatic continent. This substance forms a crust surrounding the branches and twigs of certain trees, and is the excretion of an insect called *Coccus lacca*. The insect belongs to the natural order Hemiptera, genus Coccida, which are remarkable for their powers of propagation, and often their numerous offspring are so closely crowded together that the trees on which they live are exhausted and injured by them. Hampden G Glasspoole, in the British *Pharmaceutical Journal*, says: The trees selected by these insects for the depositing of their eggs are the bishar tree, *Croton lacciferum*, the *Butea frondosa* (palus prass or dhak), *Ficus religiosa* (peepul), and *Schleuhera trijuga* (koosum). Of the last mentioned tree Dr. Brandis, in his "Forest Flora of Northwest and Central India," says, it produces the best lac, which keeps good for ten years, while the lac from other trees is said to last only two years. In the central provinces of India the natives say that lac from this tree is capable of being propagated on others, but the koosum tree itself will not admit of the propagation of lac from trees of other kinds.

Mr. J. Mackee, in a paper on "The Formation of Lac Preserves," in the *Quarterly Magazine of the Indian Forester*, vol. i., page 269, says: "After the larvæ appear, they crawl about the stem of the plant in search of the young juicy spots from which, when once fixed by their proboscis, they cannot be removed without fatal injury. The males and females are identical in size and shape, and both commence at once the formation of their cocoons by excreting a substance resembling lac, those of the male being ovoid or elliptic in form, while those of the female are more circular and exhibit three distinct apertures, arranged in triangular fashion in the roofs, one being the anal aperture through which impregnation is accomplished, and the larvæ eventually swarm, the other two those by which the insect obtains a supply of air. About ten weeks after the birth an important change takes place in the larvæ, the female cocoons are completed, and the insects have assumed the final or imago state. As the female insect never shifts her place, but remains fixed in the position she first took upon the twig, the male is obliged to seek her, which he does by leaving his cell in a backward manner by the ventral aperture, and crawling on the female cell, he fulfills his office, and almost immediately dies. Impregnation having been accomplished, the female busies herself in sucking up large quantities of the vegetable juices, increases greatly in size, and begins the excretion of true lac. The oval body of the insect becomes a deep red color, and if at this stage a piece of the lac incrustation is broken off the insect is perceived as a little bag of red liquid (which yields the dye), and the place where the wound has been made bears a snow-white mark, as if it had been touched with a point of chalk; a similar mark is also found under every insect. Under the microscope they clearly appear to be specks of a semi-crystalline saline efflorescence. After having laid her eggs, the female dies, and soon a new generation swarms forth to enact the same process again. The thickness of the lac incrustations varies from half an inch to an inch in diameter. The branches are broken off from the trees by the natives, and in this state it is carried to market and called stick-lac."

In commerce there are three varieties of lac, known as stick-lac, seed-lac, and shell-lac. Stick-lac, as just stated, is the resinous substance gathered on the branch in its natural condition, and often containing the dead insect; this when chewed colors the saliva a beautiful red, and when burnt emits a strong agreeable odor. When stick-lac has been separated from the branches, etc., and coarsely pounded, the native silk and cotton dyers extract the red color from it by boiling it in water. The yellowish, hard, resinous powder which remains has somewhat the appearance of mustard seed, and is called seed-lac; this is sometimes melted together, and called lump-lac; it is used by the natives to make bracelets, etc. Shell-lac is prepared by putting a quantity of seed-lac into long cloth oblong bags, two men holding each end of the bag extended over a gentle charcoal fire, by which process the lac melts. When quite fluid each man twists the bag so as to force out the melted substance, and this drops upon pieces of the stem of the plantain (*Musa paradisiaca*), placed beneath, the smooth and glossy surface of which prevents the lac from adhering. The degree of pressure regulates the thickness of the coating; at the same time, the fineness of the material the bag is composed of determines its clearness and transparency.

The chemical constituents of the different kinds of lac from the analysis of Dr. John Unverdorben (who made resinous bodies his particular study) and Hatchett appear to be as follows:

Stick-lac on the branches, etc., just in the state it is found contains:

1. An odorous resin, soluble in alcohol and ether.
2. A resin insoluble in ether.
3. A bitter balsamic resin.
4. Acid of lac (laccic acid).
5. A dun-yellow extract.
6. Coloring matter analogous to that of cochineal.
7. A fatty matter like wax.
8. Some salts and earth.

Unverdorben classified the resin produced in lac, besides the coloring matters and laccic acid, thus:

1. A resin soluble in ether and alcohol.
2. A resin, insoluble in ether, soluble in alcohol.
3. A resinous body little soluble in cold alcohol.
4. A crystallizable resin.
5. An uncrystallizable resin, soluble in ether and alcohol, but not in petroleum.

Seed lac contains, by Mr. Hatchett's analysis, in 100 parts:

Resin	68·0
Coloring matter	10·0
Wax	6·0
Gluten	5·5
Foreign substances	6·5
Loss	4·0
	100·0

Dr. John's analysis gives very similar results, save that among the foreign substances he notices 1·0 salts of potash and lime, to which probably the white spots on the bark under the incrustation, which were previously noticed, may be due.

Shell-lac, according to Mr. Hatchett's analysis, gives:

Resin	90·5
Coloring matter	0·5
Wax	4·0
Gluten	2·8
Loss	1·8
	99·6

Lac resin can be procured pure by solution in alcohol; it makes an excellent varnish. It is soluble in diluted hydrochloric and acetic, but not in sulphuric acid. Shell-lac has a great tendency, says Dr. Ure, to combine with salifiable bases, as with caustic potash, which it deprives of its alkaline taste. This solution, which is of a dark color, dries into a brilliant transparent reddish-brown mass, which may be redissolved both in water and alcohol. By passing chlorine in excess through the dark colored alkaline solutions the lac resin is precipitated in a colorless state. When this precipitate is washed and dried, it forms, with alcohol, an excellent pale yellow varnish, especially with the addition of a little turpentine and mastic. With the aid of heat shell-lac dissolves readily in a solution of borax.

Lac-dye or cake lac is produced from a watery infusion of ground stick-lac evaporated to dryness and formed into cakes about two inches square and half an inch thick; these are of various qualities and stamped with peculiar marks to designate their different manufacturers. This dye is of a splendid crimson color and is used by the natives for dyeing silk, but seldom for cotton on account of the expense. The color of the red leather of Nurpur and other places is due to this dye. This dye has long been known in Europe, for before the discovery of the cochineal insect it was universally employed for dyeing red. The crimsons of Greece and Rome and the imperishable reds of the Brussels and Flemish schools were obtained from this insect.

Dr. John's analysis of these cakes is as follows: Coloring matter, 50; resin, 25; solid matter, consisting of alumina, plaster, chalk, and sand, 22. These cakes when prepared for dyeing are dissolved in diluted muriatic acid, and tin is the mordant, and this gives a very brilliant scarlet hue to woolen cloths.

Lac has been known to the Hindoos for many ages. Their carpenters mix the crude substance with native spirit, which produces a strong colored varnish which they use instead of paint for the woodwork of their houses, temples, etc. The beautiful glossy lacquer with which the Indian houses, etc., are covered is also produced from the same source. Indian lapidaries make use of lac as a vehicle for retaining the hard powders used in cutting and polishing gems. Coarse lac is used for making bangles or ornaments in form of rings for the arms of the lower classes of females, the best shell-lac being used in the manufacture of ornaments for the superior classes.

In Ainslie's "Materia Indica" it is stated that a tincture of lac is a favorite medicine among the Arabians in preparing cleansing washes; they call it "meliawer." Also a decoction of stick-lac in mustard seed oil, to which has been added a little powdered root of the *Morinda citrifolia* is used in Behar as an unguent for anointing the body in cases of general debility. Lac is found in most parts of India; in the central provinces it occurs very extensively. It is also found in some of the countries of Southern Asia, Siam, Ceylon, some of the islands of the Eastern Archipelago, and China, Siamese lac being held in high estimation.

MISCELLANEOUS INVENTIONS.

An improved automatic fire extinguisher has been patented by Mr. Paul Oriolle, of Nantes, France. This is an apparatus which automatically attacks a fire immediately on its breaking out. This apparatus is caused to act by the slightest abnormal rise of temperature, and consequently operates so as to extinguish the fire at the very beginning. The principle of the apparatus is based on the use of substances fusible at low temperatures for closing the orifices of pressure water pipes, so that the fusion of such substances causes the opening of the pipe, and creates a continual projection of liquid.

An improved rotary clothes drier has been patented by Mr. Horace Palmer, of Lebanon, Conn. The invention consists in a rotary clothes drier having a slotted pivoted post, with bars hinged to it, and carrying the clothes lines. To these bars are hinged the upper ends of connecting bars, the lower ends of which are pivoted to crossed bars placed in the slots of the posts, and held down by a lever to put the clothes lines under tension.

An improved necktie fastener has been patented by Mr. Jacob Goldberg, of New York city. This invention relates to devices for attaching a necktie to a collar button; and it consists in a case containing an apertured spring-operated slide adapted to engage with a collar button to hold the necktie in position.

An improved pistol and carbine holder has been patented by Mr. Louis S. Flatau, of Pittsburg, Tex. The object of this invention is to provide cheap and efficient means for carrying firearms either upon the person or on horseback, it being so constructed that the arm may be quickly and easily drawn for use and easily returned to place in the holder.

An improvement in beehives has been patented by Mr. Daniel K. Barnhart, of Gaines, Pa. The object of this invention is to keep bees warm and dry in winter and cool in summer. The upper part of the hive and the honey boxes, when used, are surrounded by an air chamber, which protects the bees from the heat of the sun.

Mr. Robert W. Pain, of New York city, has patented an automatic harmonica in which a perforated sheet of paper is employed to regulate the admission of air to the reeds. The invention consists in the combination of a perforated strip of paper or music sheet, and a flexible wind-chest or air-compressor pump, with an ordinary harmonica or similar instrument, whereby the harmonica is made to execute tunes automatically.

Mr. James M. Hawley, of Odin, Ill., has patented an improved machine for cleaning, separating, and grading grain. This machine separates wheat from other grains and seeds, and grades the wheat according to the size of its kernels. It will readily separate timothy and red top seeds.

An improved cotton chopper and cultivator has been patented by Mr. James D. Patterson, of Competition, Mo. This machine is well designed and arranged for the peculiar work of cotton cultivation. It is provided with plates to be forced into the ground by the feet of the operator to bar off the plants, and their construction permits of their passing over any rubbish, and thus prevent the rubbish being dragged along and the plants being torn down thereby.

An improvement in harvesters, patented by Mr. Stephen McB. Krigbaum, of Golden, Col., relates to that class of harvesters in which the cut grain is carried across the platform and elevated to a binder's table or to a binding mechanism. The object of this invention is to insure the even falling of cut grain upon the platform, and thereby prevent the loss of grain resulting from the uneven falling of the grain.

An improvement in spring wagons has been patented by Mr. George A. Elliott, of North Grosvenor Dale, Conn. This invention relates to that class of carriages known as skeleton, buckboard, and side bar carriages or buggies; and it consists, principally, of a novel construction and arrangement of the springs, whereby the buggy is made light, easy riding, and low.

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Electrical Patents in the United States.

The subject of patents has always been an interesting one in the United States, but it seems to be on the increase even now.

During the year 1881 nearly 16,000 patents were granted in the United States, a larger number than was ever granted before in this or any other country.

This would seem to indicate increased inducements to special inventors in certain lines of invention, were it not for the fact that a careful study of their special classifications adopted by this Patent Office shows no marked increase in any particular class, with one single exception, viz., electricity.

In that class there has been remarkable energy displayed, and the Commissioner has found it necessary to divide the classification within the year by transferring to other divisions of the examining corps such details as could be properly spared and yet not materially affect the class proper.

The division of electricity has grown to be the largest in the Patent Office, with an average monthly showing of over two hundred new applications.

It has been the practice in the Patent Office to observe with the greatest strictness a proper classification, and to this end only such details as gas lighting devices, electrical registers, conductors, insulators, and, in short, those devices not purely electrical in their nature, have been lopped off. There are now employed in the electrical division one principal examiner, seven assistants, and three clerks, a larger force than in any other division in the office, and yet it has been found necessary to make the transfers above noted in order that the work might be kept up. On the above force there devolves the duty of examination as to novelty, utility, operativeness, etc., and oftentimes careful and accurate experiments are made to prove the assertions alleged in descriptions of inventions.

By order of Commissioner Marble, of the Patent Office, all United States patents appertaining to or bearing upon electricity granted prior to July 1, 1881, have been reprinted and the drawings thereof reproduced and bound up in neat substantial quarto volumes of about two thousand pages each. There are sixteen such volumes, the subject matter of each being of such sub-classes as naturally relate to each other, thus giving in each volume a full *resume* of the state of the art from its origin to date. There were issued to, and including, the above date, 3,825 such patents, which are subdivided into sixty-nine sub-classes.

The following table shows the number of each particular kind of patent which relates directly to the telegraph, to wit:

Telegraphs	46
" (automatic)	111
" (dial)	23
" (duplex)	61
" (dynamo)	8
" (multiplex)	7
" (perforating)	26
" (printing)	191
" (quadruplex)	19
Circuit closers	31
Condensers	5
Electro-magnets	42
Keys	42
Lightning arresters	8
Morse registers	20
Relays and sounders	111
Conductors	149
Insulators	107

In duplex and multiplex telegraphy there has been but little advance, but there are pending applications for patents for several valuable inventions.

In telegraphs and telegraph apparatus but slight advance is apparent, the leading inventions being in the applications of dynamo instead of batteries for telegraphic purposes.

There is also much interest manifested in relation to the Faure secondary battery, and applications are pouring in upon that subject, but as yet nothing appears to be any advance upon what Faure has done. There is, however, as much interest developed in dynamo machines, and there are at present pending over one hundred and fifty applications.

The telephone occupies the minds of would-be patentees to a wonderful extent. The first telephonic telegraph patents were granted in 1875, and before January 1, 1878, they numbered less than two dozen. Now they constitute in all eight sub-divisions, embracing all kinds of telephones, telephone telegraphs, alarms, calls, appliances, etc., all told 438 patents.

A large interest is also apparent in telephones and telephone exchange systems, and there are pending over two hundred applications on these devices.

Some idea may be formed about the interest manifested in America as to the future of the electric light when it appears that there are now pending over three hundred applications for patents on various features thereof, a large majority of such applications being for what is known as incandescent patterns and their appliances.

Taking the subject of electrical patents as a whole the most activity has been exercised within the following during the past three years: 1, electric lights; 2, dynamo machines; 3, telephones and their appliances. Prior to January 1, 1878, there were only 20 patents on electric lights; July 1, 1881, there were 192. Prior to July 1, 1879, there were only 19 dynamo and magneto machines; July 1, 1881, shows 111.

Where there are so many minds brought to bear upon kindred subjects it is not strange that many should invent the same thing, or take the same method of obtaining similar results in scientific experiments and investigations. This is found in the examining department of the Patent Office to often be the case with electrical appliances. Old patents are innocently re-invented and several persons frequently invent the same thing. This is mainly because they are prescribed by the immutable laws of science that must be always obeyed under certain given relations. Some of the wonders of electricity applied by Franklin in his investigations would be thought new and astonishing if shown for the first time at this day. In 1748, at a picnic, he "killed a turkey by the electric spark, and roasted it by an electric jack before a fire kindled by the electric bottle."

The practical storage of electricity was long ago proved by Franklin's "bottled lightning." If many of the inventions now prove to be of no immediate practical use or advantage they may yet lead to something in the future that will be of constant use and great benefit to the world. This has always been remarkably true of electricity, more than of any other department of science or mechanics.—*Journal of the Telegraph.*

How Paper Car Wheels are Made.

The Allen Paper Car Wheel Works are located at what is now the northern extremity of Pullman, Ill., though the Union Foundry and Car Wheel Company is building a large foundry and dwelling houses about half a mile north of this point, which will doubtless become a part of Pullman at an early day. The buildings of the Allen Company are two parallel structures, extending 370 feet north and south by 150 feet, connected in the center by an annex. The rear building is used for a foundry, and in the front building the paper car wheels are made and fitted into their casings. On the second story are the offices of the company. Above the center floats a flag bearing the words, "The Allen Paper Car Wheel Company."

The *Western Paper Trade* says: Entering the office, the visitor is conducted to the point on the first floor where the straw board is received, at present at the rate of about a car-load a week. It is the ordinary straw board of commerce, which until recently had been purchased at the Rockton Mills, in this State, but is now made at the Allen Company's mill at Morris, Ill., where it is cut by machinery into circular disks, with a hole in the center for the hub of the wheel. These disks are a little larger than the sizes required for the wheels, which are 26, 33, and 42 inches. Three of these disks are fastened together with ordinary flour paste, applied by hand with a brush, and the triple sheets are piled together to the thickness of three or four feet. Then the mass is placed in a hydraulic press and subjected to a pressure of about 650 tons for three hours. When removed from the press each three sheets is found incorporated into a single solid board. These boards are sent up-stairs to the heating room and subjected to a temperature of 120° Fah. for two weeks, or until every drop of moisture has been extracted. They are then sent down stairs and pressed again to straighten them, and pasted together, dried and pressed again and again, until they are of the thickness required for the wheels, having to undergo hydraulic pressure three times, and to remain in the drying and seasoning rooms some six weeks, or even more.

When the paper material for the wheels is prepared, it varies from four to five inches in thickness, according to the size of the wheel, and is as solid as the hardest wood. One hundred and seventeen sheets of ordinary straw board contribute to the paper structure of a 42 inch wheel, and one hundred sheets to a 26 inch wheel. After being thoroughly dried the paper block is carried to the trimming room and placed upon a lathe, the tender of which is given a steel tire to which the block is to be fitted, and it is turned to the required size, which is always a little larger than the interior of the tire that is to cover the edges of the paper. Then the block is handed over to the painter, who treats it to two coats, consuming about a quarter of a pound of brown mineral paint, and it is then ready to be fitted into the tire. It is again removed to the ground floor, and forced into the tire by hydraulic pressure, applied at the rate of 3,000 pounds to the square inch, so that the paper block fits as closely as possible into the rim of the wheel, the whole structure forming a very compact mass. The hub is then forced into its place, and heavy iron plates fastened upon either side of the wheel by strong bolts extending through it. The wheel is then ready for use. A 42 inch wheel will weigh about 1,115 pounds, divided as follows: Paper, 185 pounds; tire, 560 pounds; side plates, 140 pounds; hub, 200 pounds; bolts, 50 pounds. The tires are of the best German steel, made at the Krupp Works in Prussia; the wrought iron plates, hubs, and bolts are of American material, the castings being made at Pullman. American tires are not used, it is stated, because they are not yet made in sufficient numbers to supply the demand.

About eighty men are now employed in the Allen Works here, and the company have a factory of about the same capacity at Hudson, N. Y. More men will be required here, however, when the new machinery, now making, is completed. At present twenty-four to twenty-six wheels a day are made, but it is expected to increase this number 25 per cent within a short time. The cost of a 33 inch paper wheel is about $80, and of an iron wheel of the same size not far from $15, but it is claimed that the paper wheel will outlast and outwear the iron wheel to an extent that renders the former a decided economy. A distance of 100,000 miles is about the maximum service to be obtained from axles with iron wheels, while on various roads the axles used with paper wheels have averaged over 400,000 miles each. This difference is accounted for on the ground that the paper centers intercept or absorb all vibration occasioned by contact between the tire and the rail, while with iron wheels this vibration is submitted to the axle, thereby causing a more rapid wearing of the journal, and the disintegrating of the axle.

The paper wheel is practically indestructible, and can be used indefinitely. When the steel tire wears out a new tire can be placed over the paper, and when a breakage occurs these wheels are sent back to Pullman to be repaired. The danger from accidents by their use is said to be reduced to a minimum. The Pullman Palace Car Company have used the paper wheels for about ten years, and according to Mr. A. B. Pullman's statement, "have never had an accident caused through broken wheels or axles with any cars having paper wheels under them. While the present style of wheel has been in service we never had a paper wheel fail *en route.*" This is another tribute to paper as an element to civilization. The man would have been considered a "crank" who, fifteen years ago, had predicted that paper car wheels would outwear and be safer than iron wheels. The first paper car wheels were made by Richard Norton Allen, in Brandon, Vt., in 1869, and these wheels were first used on a Pullman sleeping car in 1871.

RECENT INVENTIONS.

An improved horseshoe has been patented by Mr. James B. Finch, of Bozeman, Montana Ter. The object of this invention is to relieve the feet of horses from the jar or shock of traveling on hard or paved roads, and also to provide for removal of the calks from the shoe. The invention consists in a flanged calk and rubber block combined with a recessed shoe.

A cheap, efficient, and easily removable shoe for protecting the feet of fat cattle and oxen while being worked or driven long distances upon the road, has been patented by Mr. John M. Goodman, of Mill Creek, Pa. This invention consists principally of two right and left ground shoes or plates, upon which the foot of the animal rests, each plate being provided with upwardly projecting side flanges or fenders, which are inwardly inclined and curved to fit the sides of the hoof, the two parts of the shoe being adapted to be secured upon the foot in any suitable manner.

Mr. David F. Goodyear, of Memphis, Tenn., has patented a can, box, or receptacle for grocers, druggists, and family use, for holding dry comminuted substances, from which small quantities can be conveniently taken without exposing the contents of the can, box, or receptacle to the air, or taking the can or receptacle from the shelf, or removing it from the position in which it is placed. This invention consists principally of a can having a lower or bottom compartment, with a removable sliding scoop, the main compartment of the can being provided with a hopper-shaped bottom opening immediately above the scoop, and adapted to be opened and closed by a slide operated from the outside of the can.

A corroding house for the manufacture of white lead by the old Dutch process has been patented by Mr. William H. Wetherill, of Philadelphia, Pa. These improvements relate to the buildings or houses used in the production of lead carbonates by the old Dutch process of corrosion. These houses have been constructed of wood, and are expensive both in first cost and in maintenance on account of their rapid decay. The invention consists in a permanent structure of stone or brick constructed to facilitate the process.

Mr. Edwin E. Glaskin, of Lower Cape, New Brunswick, Canada, has patented an improvement in the class of fire kindling blocks containing sawdust, resin, and tallow, or some other oleaginous substance. Such blocks have had two prominent defects, which have greatly impaired their utility—that is to say, they have been either too soft, so as to soon lose their form and adhere together, or too brittle and friable, so that they would not retain their shape, but crumble into fragments. These results are due to lack of due proportion of the ingredients and of sufficient pressure when the blocks are being moulded. The process of producing the fire kindling blocks consists in mixing dry sawdust with resin and oil, in the proportions respectively, of five parts, one part, and one-sixteenth of one part, and then placing the mass in suitable moulds and compressing it to the degree of one thousand pounds, or thereabout, to the square inch, for the purpose of compacting it into hard non-friable blocks.

An improved stereotype-plate holder has been patented by Mr. Andrew Overend, of Philadelphia, Pa. This invention consists of a metallic stereotype block having improved means for holding the plates. A graduated gauge block is provided for fixing or determining the margins.

Messrs. William B. Padgett and Willis J. Brock, of Batesville, Ark., have patented a wagon brake, constructed so that it is applied to the vehicles automatically when the team ceases to draw, and the power of the brake can be increased and the brake locked away from the wheels at the will of the driver.

An improved process of treating hide in the manufacture of counter-stiffeners has been patented by Mr. William H. Metcalf, of Brooklyn, N. Y. The object of this invention is to render hide counters waterproof, so that they shall retain their rigidity under all circumstances. The invention consists in a process of treating the hide, which consists in saturating with a solution of benzine, paraffine, and drying oil.

An improved sap spout has been patented by Mr. George J. Record, of Conneaut, Ohio. The invention consists in the combination with the tapering tube of an eccentrically perforated ring flange, whereby additional security is obtained against the accidental detachment of the sap bucket.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

A Human Barometer.

The real relation between the human body and the weather scientifically explained.—One of the most valuable developments of modern science along the line of human necessity is the National Weather Bureau at Washington. Experience has shown that eighty-six per cent of the predictions of the signal service are accurate; and these predictions are unquestionably of the greatest advantage to the seaman, the agriculturist, and the entire commercial world. The service has proven its necessity by its usefulness, for in past times the facilities for foretelling atmospheric changes were meager indeed. The only indications our fathers had of coming changes in the weather were aching limbs, twingeing joints, or painful corns. These "indications,' though crude, were usually correct, and hence naturally suggest the inquiry as to the relation between the human system and the weather. The body is unquestionably an excellent barometer. It foretells changes in the atmosphere long before they occur, and this fact has been taken advantage of by physicians, who, when all other agencies fail, prescribe a change of air, thus hoping the body may find an atmospheric condition better suited to its needs. And yet the real relation between the human body and the weather has never been fully understood, nor has there ever been, until now, a correct explanation of what rheumatism (which seems in league with the atmosphere) really is. It was originally thought by many to be a trouble in the joints, and as such was treated in the most strange, not to say ridiculous, manner. This theory became dispelled when the same trouble attacked the muscles, and the feeling then prevailed that it was purely a muscular disorder. But this idea was found to be too narrow, and now it is universally conceded that rheumatism is a blood disease. And what a terrible disease it is. It often comes without warning and prostrates the system with agony. Again, its beginning is gradual, and its growth slow. In its acute form it manifests itself in every conceivable shape and is always accompanied by intense pain. At one time it is inflammatory, at another neuralgic. Sometimes it assumes the form of gout, and again that of pleurisy or lumbago; but in whatever manner it appears it is terribly painful and always to be dreaded. The pain and annoyance of rheumatism are increased by its great danger, for it is liable to attack the brain or heart at any moment, thereby causing instant death. Indeed, nearly every case of heart disease with all its dreadful suddenness which has ever occurred, can be traced more or less directly to rheumatic causes. In its chronic form it stiffens the joints, contracts the muscles, undermines the health, and ruins the life. It frequently attacks men and women who are apparently in perfect health. Indeed, it is as greatly to be dreaded as any possible form of physical woe.

But, however severe its effects may be, the exact cause of this blood trouble has been an undecided question, and it is only within the past year that any decision upon the subject has been reached. In order to fully determine what the cause of rheumatic disorders really was, certain authorities sent letters of inquiry from Washington to the leading practicing physicians of the land, and these inquiries were responded to quite generally, thus furnishing data of great value to science and mankind. The views held by the doctors are of a varied nature, but so overwhelming a proportion hold to one belief as to leave but little doubt that it is the correct one. This belief, briefly stated, is that uric acid in the blood causes rheumatism, and that it is only by removing this poisonous acid that rheumatic or neuralgic troubles in all their terrible forms can be cured. This being true the important question arises: "How does this poisonous uric acid get into the blood, and how can it best be removed?" Uric acid is found in the blood because the kidneys are weakened and cannot throw it from the system. Restore the kidney and you restore the power that will force the uric acid from the system and thus banish the rheumatic agonies which it causes. This is reason; it is science. No one whose kidneys are in a perfect condition was ever troubled with rheumatism, and no rheumatic sufferer, however slight the pain may be, has perfect kidneys. The conclusion of this truth is inevitable: perfect kidneys mean freedom from rheumatism.

When rheumatism has manifested itself in any special part of the body, attempts have usually been made to treat that part of the body. As a result the pain has departed, but the disease has remained, lying subtly concealed and ready to break out at some unexpected moment. Checking the pain in any single locality only scatters the disease through the system, when, if the seat of the disorder, which is the blood, were reached, a complete cure would be the result. The way, therefore, to expel this rank and poisonous acid before it assumes an inflammatory or chronic form is by keeping the kidneys in absolute health. This is no easy thing to do, and no means has, until within the past few years, been known which would successfully reach and affect these great organs. At last, however, scientists have discovered that the leaves of a tropical plant, previously but little known to science and unknown to medicine, possessed marvelous qualities adapted for the kidneys. These leaves have been skillfully combined in the remedy now known as Warner's Safe Kidney and Liver Cure. It is up to the present time, the only known preparation that acts so directly upon the kidneys as to remove all uric acid from the blood, and hence the cures it has been the means of performing are really very remarkable. Indeed, there are thousands of persons in America to-day who owe their restoration to health and entire freedom from rheumatism to this simple yet powerful remedy.

This theory as above explained finds its confirmation in the fact that when the kidneys have been cured, rheumatism is completely removed. This is not, of course, always accomplished instantly, for in a disease so subtle, death is often sudden and the cure slow, but under no other plan can any hope of permanent relief ever be found. There are hundreds of cases on record during the present winter of persons afflicted with rheumatic troubles of the worst order who have been entirely cured by following the theory above stated and using the remedy mentioned. Many of these persons had the very worst possible symptoms. Vague aches in different portions of the body were followed by agonies the most intense in some particular spot. Acute and throbbing pains succeeded each other and the coursing poisonous acid inflamed all the veins. Troubles which began with slight disorders increased to derangements the most serious. It is sad to think that all this suffering was endured when it could have been so easily relieved. Acting upon the theory and using the remedy above mentioned the kidneys could have been restored to their usual vigor, the uric poison expelled from the system the inflammation removed, and the pain entirely banished.

These are some of the rea and scientific facts regarding rheumatism, attested by the highest authority, and they are, beyond question, the only correct ones ever brought forth. We are aware they are advanced ideas, but ten years hence they will be the accepted belief and practice of the world. If people suffer from rheumatic troubles in the future, and with these plain truths before them they certainly can blame no one but themselves.

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For Mill Mach'y & Mill Furnishing, see illus. adv. p.188.

Send for Pamphlet of Compilation of Tests of Turbine Water Wheels. Barber, Keiser & Co., Allentown, Pa.

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Latest Improved Diamond Drills. Send for circular to M. C. Bullock, 80 to 88 Market St., Chicago, Ill.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Diamond Engineer, J. Dickinson, 64 Nassau St., N.Y.

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Improved Skinner Portable Engines. Erie, Pa.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 173.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p.173.

4 to 40 H. P. Steam Engines. See adv. p. 174.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 174.

Draughtsman's Sensitive Paper. T. H. McCollin, Phila., Pa.

For the Garden and Farm.—A great variety of Seeds and Implements. Send for catalogue. Address R. H. Allen & Co., P. O. Box 376, New York city.

See Bentel, Margedant & Co.'s adv., page 205.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 206.

Barrel, Key, Hogshead, Stave Mach'y. See adv. p. 205.

Blue Process Paper is made by Keuffel & Esser, 127 Fulton St., New York. Send for circular.

Renshaw's Ratchet for Square and Taper Shank Drills. The Pratt & Whitney Co., Hartford, Conn.

Telegraph, Telephone, Elec. Light Supplies. See p. 205.

50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

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Elevators, Freight and Passenger, Shafting, Pulleys and Hangers. L. S. Graves & Son, Rochester, N. Y.

The Medart Pat. Wrought Rim Pulley. See adv., p. 206.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 205.

Centrifugal Pumps, 100 to 35,000 gals. per min. See p. 205.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Cope & Maxwell M'f'g Co.'s Pump adv., page 204.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schumm & Co., Philadelphia, Pa. Send for circular.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co., 430 Washington Ave., Phil. Pa.

The Sweetland Chuck. See illus. adv., p 206.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Soloman's Parallel Vise. Taylor, Stiles & Co., Riegelsville, N.J.

Electric Lights.—Thomson Houston System of the Arc type. Estimates given and contracts made. 631 Arch, Phil.

Common Sense Dry Kiln. Adapted to drying of all material where kiln, etc., drying houses are used. See p.205.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) G. L. K. asks: 1. Can you give receipt for a good secret postal card ink? A. Use a dilute solution of pure cobalt chloride in water. 2. A receipt for ink that disappears in a few days? A. Use an ink prepared from iodide of starch. 3. A receipt for removing old paint from wagons, etc.? A. Use a strong alcoholic solution of potash, followed by a thorough rinsing in water. 4. Is it safe to try the following experiment, and will it work, namely: Light may be obtained instantly without the use of matches, and without the danger of setting things afire, thus: take an oblong vial of the whitest and clearest glass; put into it a piece of phosphorus about the size of a pea, upon which pour some olive oil heated to the boiling point, filling the vial about one-third full, and then seal the vial hermetically. To use it, remove the cork and allow the air to enter the vial and then recork it. The empty space in the bottle will then become luminous, and the light obtained will be equal to that of a lamp. A. Phosphorus should be handled with care, as the slightest friction will sometimes ignite dry phosphorus; the substance sometimes inflames spontaneously when not covered with water. The phosphorescent glow produced by these oil phosphorus lamps is very faint.

(2) W. H. B. says: Can you give me any simple method for granulating zinc for use in a chemical laboratory for reductions, etc.? I have tried melting the zinc which I have in sheets, about three thirty-seconds of an inch thick, and dropping it into water as it melts, but it is not satisfactory. The zinc should be about the size of small shot. A. Make a mixture of equal parts of talc, or soapstone and charcoal, in finest powder, and pour the melted metal, in a thin stream, with a quantity of this, contained in a tray. The tray should be constantly agitated so as to prevent the agglomeration of the metal. Zinc can thus be reduced to the size of small shot.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

W. S. L.—Galena and lead carbonate in quartzose rock. Some of this ore probably contains much silver. An assay would be necessary to determine its value.—A. J. O.—Manganite of medium purity.—J. B. H.—It is a partly altered white silicious feldspar. Useful for pottery, etc.

English Patents Issued to Americans.

From February 28 to March 10, 1882, inclusive.

Boot lasting machine G. N. Copeland, Boston, Mass.
Bottle stopper, G. D. Dows, Boston, Mass.
Cotton opening and lapping machine, R. Kittson, Lowell, Mass.
Damper regulator V. H. Hallock, Brooklyn, N. Y.
Dynamo-electric machine, W. B. Sheridan, Cleveland, O.
Dynamo-electric machine, T. A. Edison (2), Menlo Park, N. J.
Electric generator, T. A. Edison, Menlo Park, N. J.
Electro magnets, G. Smith, Astoria N. Y.
Fur nap, manufacture of, W. E. Doubleday, N. Y. city.
Gas manufacture of, T. B. Fogarty, Brooklyn, N. Y.
Hats, manufacture of, G. Yule, Newark, N. J.
Hanger for coats etc., T. M. Donald, Austin, Texas.
Indicator, steam engine G. H. Crosby Mass.
Lead tubes, manufacture of, E. W. Blatchford & Co., Chicago Ill.
Lock nuts, W. H. Paige, Springfield, Mass.
Locomotive engine, J. Swan *et al*, Montgomery, Ala.
Metal, extracting from ore, N. F. Evans, Philadelphia, Pa.
Motive power, F. Pool, Kanawha, Va.
Motor apparatus, M. Rosenstock, New York city.
Nielo, imitation of, F. Beck, New York city.
Paper, manufacture of from cotton stalks, F. Wheaton, Brooklyn, N. Y.
Preventing shifting of cargoes in ships, E. H. Farrar, New Orleans, La.
Reaping machine, F. F. Kanne, Waterville, Minn.
Reaping machine, H. R. Allen, Indianapolis, Ind.
Reaping machine, Mr. Cochran Indianapolis, Ind.
Reflectors, W. Wheeler, Mass.
Rock drills, A. Shedlock, New York city.
Rotary engines, Elastic Wheel and Manufacturing Company, Waynesborough, Va.
Safety pins, J. Jenkins, Montclair, N. J.
Sewing machine, Morley Sewing Machine Company, Boston, Mass.
Ships, construction of, A. P. Bliven, New York city.
Staples, G. Smith, Chicago, Ill.
Starch, manufacture of, W. T. Jebb, Buffalo, N. Y.
Stone, artificial, A. Pelletier, Washington, D. C.
Vehicle, propulsion of, P. Collamore, Boston, Mass.
Ventilators, P. Mihan, Mass.
Wheel gearing, J. B. Tibbits, Troy, N. Y.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

March 14, 1882,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

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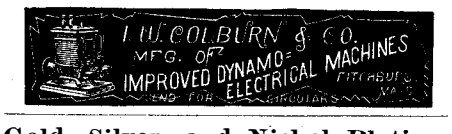

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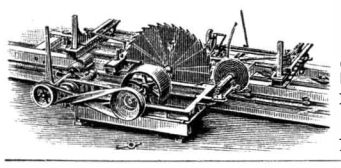

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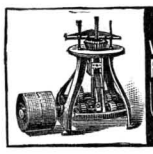

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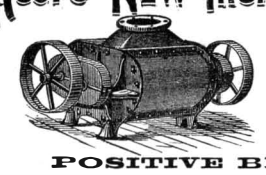

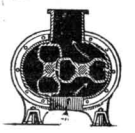

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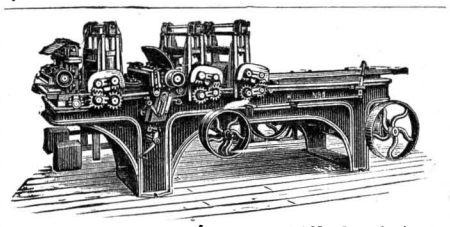

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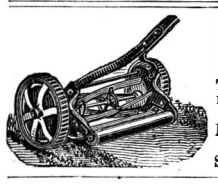

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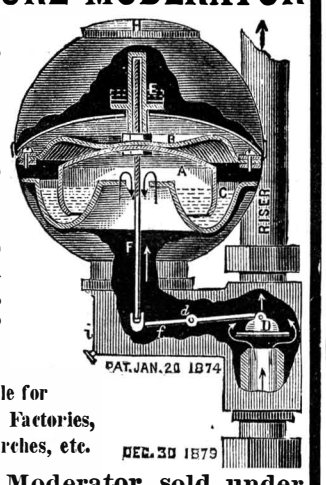

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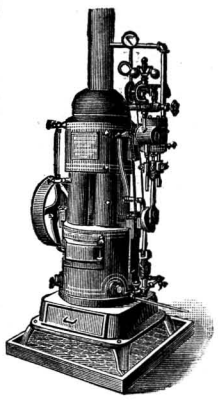

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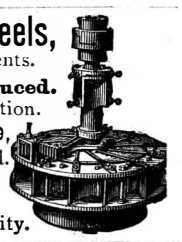

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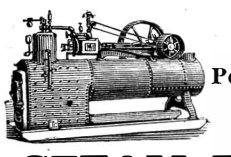

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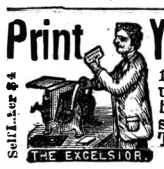

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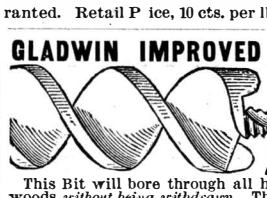

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